THE BLANK(ISH) SLATE: BIOLOGY'S RETURN TO ANALYSES OF HUMAN AFFAIRS

by

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ABSTRACT

Intellectuals today frequently incorporate biology into their analyses of human affairs. The fact that they do so is rarely acknowledged, much less questioned. However, when one learns the history of the relationship between biology and the social sciences, today's casual use of, and often dependence on, biological factors becomes a mystery. In the early 1900s thinkers of all stripes looked to biology—specifically the evolution of human beings—for guidance. Then, after the horrors of the holocaust became clear, Western society rejected the notion of innate biological differences between people and championed instead the paradigm of behaviorism, or the notion that all human beings are "blank slates" upon which culture scripts its values and ideas. How, then, did it come to pass that biological thinking returned to analyses of humans? In this paper I argue that two evolutionary biologists, William Hamilton and Robert Trivers, relied upon the insights of population genetics to demonstrate the evolutionary logic of cooperation and sacrifice, and that in doing so they gave the emotional and political "green light" to reintroduce biology to various fields.

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ACKNOWLEDGEMENTS

I dedicate this dissertation first and foremost to Adrienne. You were there for me from the first word to the last. Thank you, honey. Although he isn't here now, my dad's advice to "give 'em hell" and do my best continues to inspire me. I'd like to thank my Aunt Kathleen, who first introduced me to sociobiology. I owe a special debt of gratitude to Jim Clowes and the Comparative History of Ideas at the University of Washington for sharing with me new ways of thinking. Cheri Kaye has spent countless hours helping me be a better student, teacher, and writer. I would like to thank the faculty at the University of Utah history department, almost all of whom have helped me along the way. In particular, thank you, Bruce Dain, for providing me with thoughtful feedback and believing in the project.

INTRODUCTION

In February of 1978 a number of prominent scientists gathered in Washington, D.C for a two-day symposium organized by the American Association for the Advancement of Science (AAAS). Events like these are commonplace in academia and are typically collegial affairs characterized by mutual respect for the development of new ideas. But this time was different. This time a group of activists rushed toward E. O. Wilson, an elderly and mild-mannered myrmecologist (he studies ants), poured ice water over his head, and chanted "Racist Wilson, you can't hide, we charge you with genocide!"[1]

How did this happen? How did an academic conference become the scene of such high drama? The answer lies in the subject of the conference: sociobiology. Building on recent insights in evolutionary biology, Wilson had introduced sociobiology in 1975 as a new discipline capable of interpreting the evolutionary utility of animal behavior. Initially, both the academic community and the general public welcomed the new approach, as Darwin himself had speculated on the evolution of behavior in *The Origin of Species*.[2] A small group of scientists, however, unleashed a storm of protest. These

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[1] Ullica Segerstrale, *Defenders of the Truth: The Battle for Science in the Sociobiology Debate and Beyond* (New York: Oxford University Press, 2000), 23.

[2] The *New York Times* announced the publication of Wilson's *Sociobiology* on the front page. Boyce Rensberger, "Sociobiology: Updating Darwin on Behavior" *New York Times*, May 28, 1975, 1.

critics, many of whom were Marxists and feminists, believed that cultural factors made human behavior far too complex for biological analysis and they feared that sociobiology would reproduce the harmful narratives of biological determinism that had plagued the first half of the twentieth-century. Would their efforts be enough? As the water hung in the air at the AAAS conference no one knew whether the protest would come to be seen as a dramatic but necessary rejection of a crude, pseudo-scientific justification for inequality or as a politically motivated censorship of legitimate intellectual inquiry. The role of biology in analyses of human affairs depended on the answer to that question. Eventually, evolutionary thinking did in fact return to the social sciences and humanities—although how and why this occurred has yet to be explained. This project seeks to provide that explanation.

Historical Context of the Debate Over Applied Darwinian Science

In the late 1800s biologists began to accept the evolution of human beings as orthodox science. As a result, intellectuals of all stripes claimed Darwin as one of their own—radicals, racists, feminists, and conservatives all argued that evolution justified their own political or social agenda. A pivotal debate in the contest centered on whether inheritance was "soft," meaning parents passed on the physical and mental characteristics they acquired during their life, or whether it was "hard," meaning an organism's inheritance was fixed at birth.[3] In other words, would a blacksmith's son be blessed with

[3] The classic example in "soft" inheritance arguments, made by French biologist

his father's strong arms? The Left favored soft inheritance because it seemed to support social and political mobility, but they were dealt a critical blow in 1891 when August Weisman demonstrated unequivocally that offspring do not inherit acquired characteristics. As a result, Social Darwinism, or the belief that individuals and races progressed through a "survival of the fittest," came to be seen as the logical expression of evolution in society. From this perspective, the poor were weak and welfare was detrimental to the long-term health of humanity. Narratives of white superiority and women's "natural" domesticity proliferated, assuring proponents of the status quo that inequality was not oppression but the natural order.

Fortunately, the triumph of Social Darwinism did not last long. Scientists' disagreements about important aspects of evolution, most notably the role of natural selection, caused an "eclipse of Darwinism," which in turn called into question the wisdom of basing public policy on the theory of evolution.[4] At the same time, philosophers Henry Sidgwick and G. E. Moore pointed out that deriving social values from natural phenomena was a fallacy.[5] Then anthropologists and sociologists (who had only recently established their academic disciplines) asserted their prerogative to analyze human affairs using methods and theories independent of the natural sciences. Finally,

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Jean Baptiste Lamarck, is a giraffe's long neck. Soft inheritance advocates claim that a giraffe's unique phenotype is the result of generations of giraffes straining to reach the leaves on tall trees.

[4] Peter Bowler, *The Eclipse of Darwinism: Anti-Darwinian Evolution Theories in the Decades Around 1900* (Baltimore: Johns Hopkins University Press, 1992).

[5] Fritz Allhof, "Evolutionary Ethics from Darwin to Moore," *History and Philosophy of the Life Sciences* 25, no.1 (2003).

and perhaps most significantly, the horrors of the Holocaust convinced the majority of the Western world that evolutionary "fitness" had no place in discussions about men, women, and children. By 1950 it was taboo for academics to conduct biological analyses of human affairs. Post-WWII intellectuals did not see the taboo as censorship; rather, it was a defense of democratic values. With firm moral resolve, a generation still reeling from the specter of fascism established what they believed to be ground rules for the fair and open exchange of ideas. Yes, they insisted on strictly cultural analyses, but that was only because biological perspectives dictated whom society should value and they were committed to valuing everyone. Over the next twenty years, black Americans, women, and other marginalized people relied upon this premise of intrinsic equality to fight for social and political justice. The struggle was difficult and required tremendous sacrifice, but the country was making real democratic progress—and then sociobiology, in the eyes of its critics, threatened to reverse all that had been accomplished

The critics were determined to prevent the return of biological perspectives on human beings because they believed social justice depended on the assumption that all people were fundamentally the same. They denounced sociobiology because they believed it to be a flawed, reductionist science and another iteration of the cruel biological determinism that led to the ghastly murder of millions of people. This is not hard to understand. At the AAAS conference, those with the signs and the bucket make sense: they were defending liberal values. But hapless Wilson, standing on stage and soaking wet, is harder to understand. Intellectuals throughout the United States and Europe had established that cultural analysis was the best way to interpret human behavior for both intellectual and political reasons, and by all accounts Wilson was a kind

and thoughtful man. He had no business arguing that "most aspects of human social behavior and organization can only be understood in the light of their evolutionary history and evolutionary utility."[6] Yet there he was.

Hypothesis for the Return of Evolutionary Thinking in Human Affairs

My goal in this project is to make sense of the rise of sociobiology both as a development in evolutionary theory and as a harbinger of biological thinking in the social sciences. My argument is that the "modern synthesis," which unified previously antagonistic geneticists, naturalists, and paleontologists under one banner, inspired British zoologist V. C. Wynne-Edwards to propose a new theory for altruism: group selection. Because altruism had been a critical obstacle to the full acceptance of natural selection from the beginning (Darwin himself called it a "special difficulty"), Wynne-Edwards' work was of potentially great value. By analyzing bird clutch size through the lenses of population genetics and natural selection, which were two pillars of the synthesis, he was able to conclude that animals limited their reproduction to protect the species from overpopulation.

Wynne-Edwards' argument earned him tremendous acclaim, but not everyone was convinced. Other scientists, also inspired by the modern synthesis, interpreted personal sacrifice differently. In particular, W. D. Hamilton, then only a graduate student, believed animals sacrificed themselves to benefit their kin and thus improve their own genetic reproduction. His paper, "The Genetical Selection of Social Behaviour," was incredibly technical, as it relied upon complex population genetics concepts such as

[6] E. O. Wilson, *On Human Nature* (Cambridge: Harvard University Press, 1978), 43.

Sewall Wright's coefficient of relatedness, so initially it did not have much influence outside scientific circles.[7] It did, however, influence the American evolutionary biologist Robert Trivers, who built on Hamilton's insights to provide an evolutionary explanation for cooperation among non-kin in a process he called "reciprocal altruism."[8] Within a few years, E. O. Wilson became convinced that Hamilton and Trivers had established the foundation for a biological understanding of human behavior, and he popularized their work in *Sociobiology: The New Synthesis.*[9]

The first social scientists to embrace sociobiology were young anthropologists whose careers did not rest on the discipline's prevailing theories and values. In their pioneering research, Napoleon Chagnon, Sarah Hrdy, and Martin Daly reintroduced evolutionary thinking to anthropology—and a close reading of their work reveals that Hamilton and Trivers had given them the tools to do so. In fact, these anthropologists, who are now in their late sixties and seventies, each describes the moment they realized the potential of analyzing human behavior through a sociobiological lens as an "epiphany." Inspired by their colleagues in anthropology, other social scientists followed suit and became sociobiologists themselves. Pierre van den Berghe in sociology, David Barash in psychology, Robert Axelrod in political science, and Michael Ruse in philosophy all challenged the taboo against evolutionary thinking in their respective

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[7] W. D. Hamilton, "The Genetical Selection of Social Behaviour," *Journal of Theoretical Biology* 7, no. 1 (1964).

[8] Robert Trivers, "The Evolution of Reciprocal Altruism," *The Quarterly Review of Biology* 46, no. 1 (1971).

[9] E. O. Wilson, *Sociobiology: The New Synthesis* (Cambridge: Harvard University Press, 1975).

disciplines. Personal correspondence with these authors reveals that they, too, relied heavily on Hamilton and Trivers. The rise of sociobiology had begun.

Sociobiologists embraced the potential of kin selection and reciprocal altruism with nearly religious fervor. In their eyes, post-World War II intellectuals (who had been their mentors for the most part) willingly wore the blinders of cultural analysis for political rather than intellectual reasons; they had gotten swept up in the current of identity politics and allowed the values of the New Left to trump traditional liberalism and, more importantly, good science. From the sociobiologists' perspective, the Left was challenging the objectivity, and thus validity, of the entire scientific method by claiming that science was just another perspective of privilege shaped by race, class, and gender. This was too much for intellectuals who revered science as the closest thing we have to "truth" in the modern world.

When reading the early sociobiological texts one feels the enthusiasm with which they grasped the opportunity to cast aside the darkness of "politically correct" scientific censorship to let in the light of genuine intellectual exploration. They wanted to make a lasting intellectual contribution, to change the way people saw the world, and this gave them the courage to begin a discussion that others felt they weren't allowed to have. Unfortunately, if perhaps inevitably, these young, largely inexperienced academics reached too far in their work, claiming genetic explanations for specific behaviors that could not withstand scientific scrutiny. Their critics, who abhorred both the science and politics of sociobiology, rightly pointed out that the sociobiological narratives, while plausible, were not proven in any real scientific sense, and they derided them as "just-so stories" similar to children's tales about how leopards got their spots.

At this point sociobiology teetered on the precipice of failure. Despite Wilson's ambitious call to "biologize" the social sciences, it was clear the new discipline could not account for the immense complexity of human behavior. Even with the insights of kin selection and reciprocal altruism, sociobiology suffered from the same biological determinism, ad hoc fallacies, and unfalsifiability that had plagued past evolutionary analyses of human affairs. Yet there was something different, if not about sociobiology itself, then about the circumstances surrounding it. When Wilson published *Sociobiology* a small number of the world's leading scientists, many of whom came of age during the social activism of the 1960s, felt compelled to critically engage the new discipline because they feared its narratives would convince the general public and their political representatives that social inequality was "natural." Ironically, it was their criticism of sociobiology that made all the difference.

The critics of sociobiology, many of whom were leaders in their respective fields, supported the taboo mid-century intellectuals established because they believed it was the last line of the defense for progressive values. Stephen Jay Gould, Richard Lewontin, and Jon Beckwith served as the vanguard of a committed cadre of academics and other professionals who took time away from their primary responsibilities to combat the threat of sociobiology because they were convinced that racial and gender equality were at stake. They formed the Sociobiology Study Group to learn as much as they could about the opposition. They published widely, at first in a jointly written article to the *New York Times* titled plainly "Against Sociobiology," and later in a radical magazine, *Science for the People,* that kept readers informed on the current status of the fight. Eventually, a number of them wrote books entirely devoted to discrediting sociobiology. The net effect

of this Herculean effort, however, was not to repudiate biological analyses of human affairs. By going through the sociobiological tracts so closely with their red pens, the critics in effect provided the feedback necessary for sociobiologists to improve their arguments. In a near textbook case of the Hegelian dialectic, these men and women supplied the antithesis to sociobiology's thesis of genetically programmed behavior, which resulted in a remarkably productive research program centered on discerning the implications of evolved psychological predispositions. Thus the critics became the unwitting allies to the return of biological thinking in the social sciences, albeit in a more circumscribed and nuanced manner than the early sociobiologists originally claimed.

Existing Historical Literature and the Need for a New Explanation

The return of evolutionary thinking to American intellectual discourse is a largely unexplored historical phenomenon, which is both a challenge and an incredible opportunity. As of this writing only two histories explicitly cover the subject—and both of them have significant shortcomings. Hamilton Cravens, a historian of science at Iowa State University, wrote *The Triumph of Evolution* in 1978 during the heart of the sociobiology debate.[10] Cravens argued that the professionalization of anthropology and sociology in the early twentieth-century resulted in the fall of applied evolutionary thinking for both political and professional reasons. According to Cravens, the founders of these disciplines, Franz Boaz and Lester Ward, opposed Social Darwinism's justification of laissez–faire government so they discredited evolutionary perspectives on

[10] Hamilton Cravens, *The Triumph of Evolution: The Heredity-Environment Controversy, 1900-1941* (Baltimore: The Johns Hopkins University Press, 1988).

human beings. Their disciples, the newly minted anthropologists and sociologists, supported cultural analysis, in Craven's view, out of shared political values and professional insecurity. (For the two fledgling disciplines to gain credibility it was necessary to assert their prerogative over human affairs without deference to biology.) Cravens further argued that the stark dichotomy between biology and culture, commonly referred to as "nature" and "nurture," ended amicably in the 1940s, with both sides reconciling their differences and agreeing to view the two factors as inextricably linked.

The Triumph of Evolution is clearly well researched, yet two critical weaknesses undermine his argument. For one, while Cravens convincingly demonstrates the role academic rivalry played in the downfall of evolutionary explanations of human behavior, he ignores several other important factors. Philosophical challenges to evolutionary ethics, scientific alternatives to natural selection, and the Holocaust all played major roles in this process yet receive no mention. Also, his conclusion that former adversaries in the nature versus nurture debate found a happy marriage in the 1940s does not correspond with the fact that social scientists overwhelmingly rejected biological analysis throughout the 1950s and 1960s. In fact, it was this strict adherence to cultural factors that acted as the tinder in the sociobiology firestorm. How, from Cravens' perspective, does one explain the extreme opposition to the publication of Wilson's *Sociobiology* in 1975?

Carl Degler's *In Search of Human Nature* also analyzes the return of evolutionary thinking in the social sciences.[11] A Pulitzer-Prize winner and past president of both the Organization of American Historians (OHA) and the American Historical Association

[11] Carl N. Degler, *In Search of Human Nature: The Decline and Revival of Darwinism in American Social Thought* (New York: Oxford University Press, 1991).

(AHA), Degler brought impeccable credentials to the subject. His encyclopedic knowledge about the various professors involved in the bitter debate over evolution's role in human affairs makes *In Search of Human Nature* incredibly informative reading. His grasp of scientific concepts, especially ethology, allows him to articulate complex biological issues in ways most historians could not. Degler was also the first person to depict the rise of sociobiology as a return of evolutionary thinking in the social sciences, and in that regard I am indebted to his work.

In Search of Human Nature is invaluable as a groundbreaking effort to bring to light a major development in American intellectual history, yet much work remains to be done. While Degler does an admirable job explaining *what* happened (evolutionary thinking returned to the academic community at-large after a period of disfavor), he is remarkably deficient at explaining *why* this happened. For example, his argument that cultural analysis became dominant in the 1930s and 1940s due to antiracism is inconsistent with the extreme racial inequality that still ravaged the nation at this time. Further, by failing to provide supporting evidence for his vague yet fundamentally correct claim that "new developments in biology" in the 1960s caused a "revival of interest in biology" in the social sciences, Degler failed to initiate substantial academic treatment of the subject.[12]

There are other weaknesses as well. Although Degler demonstrates familiarity with Konrad and Tinenberg's research in ethology, he does not refer to the scientific advancement directly responsible for the rise of evolutionary thinking in the social sciences: the substitution of the individual for the gene as the unit of competition in

[12] Degler, *In Search of Human Nature*, 216.

natural selection. It is only through an understanding of the implications of gene-based evolution that we arrive at the possibility for altruism, which is what convinced some intrepid intellectuals that they finally had the theoretical tools for a biological understanding of social behavior. Lastly, *In Search of Human Nature* does not adequately address recent events. Like Cravens before him, Degler focuses primarily on the early twentieth-century, and while he does extend the narrative somewhat, there remain almost thirty years of the story to be told.

Histories of sociobiology by laymen provide another helpful lens into the general effort to revive evolutionary thinking in the American intellectual discourse. The most important of these works is Ullica Segerstrale's *The Defenders of The Truth*, which stands as the definitive treatment of the subject.[13] Segerstrale, a sociologist with a background in chemistry, captures the controversy in intimate detail, thanks to her personal involvement and her insightful interviews with leading scientists. *The Sociobiology Debate*, edited by Arthur Caplan, provides an informative and well-balanced introduction by abridging several of the participants' arguments into an easily accessible format.[14] John Alcock's *The Triumph of Sociobiology* is more biased, as it is written from the perspective of a sociobiology advocate, but it effectively outlines the scientific developments that inspired Wilson and his supporters.[15] If the return of evolutionary thinking were simply a matter of sociobiology's emergence within the

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[13] Segerstrale, *Defenders of the Truth*.

[14] Arthur Caplan, ed., *The Sociobiology Debate: Readings on Ethical and Scientific Issues*, 2nd edition (New York: Harper Collins, 1980).

[15] John Alcock, *The Triumph of Sociobiology* (Oxford: Oxford University Press, 2003).

scientific discourse, there would not be much to add. However, from the perspective of intellectual history, sociobiology is best understood as the catalyst for a wider adoption of evolutionary thinking in the social sciences and humanities, and thus these works are not sufficient due to their lack of historical context. For example, there is no mention of the debates on evolution's social implications during the early twentieth century, nor of the intellectual trajectories that many disciplines have taken since the sociobiology debate. Thus, a new history of the return of evolutionary thinking outside the natural sciences remains necessary.

Methodology

I do not adhere to a particular methodology. In my opinion, attempts to perform "Marxist" or "Poststructural" analyses, for example, curtail a historian's creative potential by imposing previously determined perspectives on a subject rather than allowing the past to speak for itself. That said, I think it is appropriate to view this project as an intellectual history, influenced by the Annales School's concept of "mentalities" and relying on oral history.

Intellectual history has come a long way from its origins in the "history of ideas," which Arthur Lovejoy popularized in the 1950s but has since fallen into disrepute. Unlike its predecessor, intellectual history does not study ideas as metaphysical concepts, divorced from a gritty reality.[16] To the contrary, intellectual history's central premise, as popularly understood, is "that ideas do not develop in isolation from the people who

[16] Anthony Grafton, "The History of Ideas: Precept and Practice, 1950-2000," *Journal of the History of Ideas* 67 (2006): 1-32.

create and use them, and that one must study ideas not as abstract propositions but in terms of the culture, lives, and historical contexts that produced them."[17] Most historians who study changes in thought have come to prefer the label "intellectual and cultural history" because it better captures the discipline's emphasis on the intimate connections between ideas and their political, social, and economic environments. The current project embraces the new interdisciplinary model, as the central hypothesis—that changes in scientific developments allowed progressive intellectuals to feel comfortable incorporating evolution into their disciplines—hinges on the premise that intellectual endeavors are guided by political and social values.

The Annales School, specifically the third generation of Annales historians led by Emanuel LeRoy Ladurie and Roger Chartier, viewed history as a complex, non-teleological process marked by different stages of widely shared world views.[18] These "mentalities" were not abstract concepts enforced as orthodoxy by authority; they were by-products of particular cultural contexts, and often believed without critical self-awareness. The rise of evolutionary thinking outside of the natural sciences in the late twentieth century marks the emergence of a new "mentality," one with important social and academic implications. The Annales School informs the current project in another fundamental way as well: the emphasis on the *long durée*. Fernand Braudel introduced the long durée in 1958, precipitating an era of historical scholarship focused on long-term, structural changes in society that cannot be witnessed over the course of a few years

[17] "Intellectual History," Wikipedia, accessed October 16th, 2014, http://en.wikipedia.org/wiki/Intellectual_history.

[18] Andre Burguiere, *The Annales School: An Intellectual History* (New York: Cornell University Press, 2009).

or even decades.[19] A result of this approach is a decreased dependency on archives, which tend to capture moments in time rather than general trends.[20] Similarly, this project views the return of evolutionary thinking as part of a long trajectory that began with Darwin's publication of *Origin of Species* and will last as long as man continues to contemplate the ultimate implications of our evolutionary heritage.

Published texts from a range of disciplines serve as the predominant, if somewhat unorthodox, set of primary sources for the current project, yet analysis of published texts alone will not complete all of the project's goals. One of the most conspicuous gaps in what little historical scholarship exists on the subject is a sufficient explanation for *why* intellectuals have changed their perspective on evolutionary thinking in their disciplines. Oral history methods provide the key to answering this fundamental question, as it is through personal correspondence and interviews that this project ascertains the authors' values and beliefs.[21] Personal convictions play a large role in a scholar's academic interest, yet these beliefs are often only implicit in their published work. Through extensive correspondence I have gained valuable new insight into the authors' thoughts and feelings on evolution in light of the scientific developments of the 1960s.

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[19] David Armitage and Jo Guldi, "The Return of the Longue Durée: An Anglo-American Perspective," *Annales. Histoire, Sciences Sociales* 69 (2014).

[20] Following in the footsteps of previous Annales historians, I intend to rely primarily on published texts—an approach championed in David Armitage's "What's the Big Idea? Intellectual History and the Longue Durée," *History of European Ideas* 38, no. 4 (2012): 493-507.

[21] I sought approval from the Institutional Review Board for Protection of Human Subjects (IRB) before contacting any potential participants. The board decided that my project (IRB#00082598) was exempt from their oversight.

Concluding Remarks

The antagonistic yet ultimately constructive conflict between sociobiologists and their critics changed the intellectual landscape in the West. Biological factors, while not accepted by everyone, have once again become intellectually respectable. Today, classrooms across the United States discuss without controversy how human beings' biological predispositions affect society. Popular newspapers and magazines publish articles on the genetic basis of almost every conceivable personal characteristic. There are books describing the current political divide in this country as a by-product of evolutionary psychology and others that claim one must understand human evolution to be an effective negotiator.[22] Evolution, it seems, is everywhere. As a historian, my concern is not whether the science behind these publications is valid (professional scientists are more qualified to make that judgment). My intent is to explain how biological explanations of human affairs became so prevalent, especially when previous intellectuals had effectively prohibited such thinking after World War II.

My research shows that developments in evolutionary biology inspired sociobiologists to challenge a powerful taboo against biology in the social sciences. Then a small group of politically "radical" academics critiqued who feared a return of harmful biological determinism compelled the sociobiologists to improve their earlier, flawed work until it became a productive research program that focused on the evolution of psychological predispositions rather than specific behaviors. This argument makes an

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[22] Jonathan Haidt, *The Righteous Mind: Why Good People Are Divided by Politics and Religion* (New York: Village Press, 2013) and Chris Voss, *Never Split the Middle: Negotiating As If Your Life Depended On It* (New York: Harper Business Publishing, 2016).

important contribution to intellectual history because, until now, no historian has proposed an adequate explanation for the return of evolutionary thinking in the social sciences.[23] To some degree the silence is understandable, as sociobiology was a relatively recent phenomenon and it takes time to fall under the purview of historical analysis. Further, the almost universal academic acceptance of human evolution along with the ubiquity of biological narratives in American intellectual discourse has had the effect of naturalizing the incorporation of evolution into the social sciences, of making it seem inevitable and therefore unremarkable. For most of us biological narratives have become so commonplace that we take them for granted. Familiarity, however, should not be mistaken for understanding. The return of evolutionary thinking to the social sciences was an important and controversial development in intellectual history and it is time to thoughtfully discuss it.

Despite the project's somewhat narrow focus, historians who do not specialize in American intellectual history benefit from this research as well. For reasons that remain unexplored at the present time, history as a discipline remained aloof from the zeitgeist of evolutionary thinking that swept the social sciences in response to sociobiology. As a result, almost all historians continue to view the past from a strictly cultural lens, while many modern economists, philosophers, anthropologists, and psychologists embrace biological factors in their work. Daniel Kahnemaan, for example, has earned popular and academic acclaim for his research in behavioral economics, and it appears that the

[23] The primary sources generated while researching this project may also benefit the field of intellectual history by documenting the experiences and perspectives of several elderly people who have made historical contributions. (Sadly, death and illness did prevent me from going into greater depth with some authors after I initiated contact with them.)

discipline will no longer rely strictly on the "rational actor" as the model participant in the market but rather a human being motivated by a number of irrational desires and emotions that stem from the particular biological architecture of the brain.[24] A historical account of the return of biological thinking in other disciplines raises the important question, "Are we historians limiting ourselves by neglecting an important lens of inquiry?"

Perhaps most importantly, the general public has a vested interest in the subject. The introduction of evolutionary thinking to human affairs in the early twentieth-century led to the forced sterilization of over twenty thousand people and the murder of millions more. People should know why influential intellectuals are again viewing problems through an evolutionary lens. If they do not find the logic convincing, they may wish to critically engage in the ongoing debate over biology's role in the social sciences in an effort to swing the pendulum back toward cultural analyses. Regardless of the reader's particular interest in the research, I hope she finds the narrative ahead interesting and informative.

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[24] Daniel Kahneman, *Thinking, Fast and Slow* (New York: Farrar, Straus and Giroux, 2011).

THE RISE OF SOCIAL DARWINISM

In 1859 Charles Darwin published *On the Origin of Species,* forever changing the way human beings viewed themselves and their place in the world. Europeans, the natural audience for the Englishman Darwin, were the first to feel the impact of his work. Overwhelmingly Christian at this time, Europeans believed the biblical narrative that God had created the different species and arranged them in a perfect, hierarchical relationship culminating with human beings in a place of privilege. Then, in roughly five hundred pages, Darwin decisively undermined their notion of a divine plan on earth with his thesis of evolution through natural selection. There was no plan, no purpose, no role to play. Each species, it turned out, was the end result of a random, meaningless process. And, while Darwin did not directly address human beings in *On the Origin of Species*, the implications for God's "children" were clear.[25]

The deceptive simplicity of evolution leads one to imagine a single "eureka!" moment much like the apocryphal falling apple that inspired Isaac Newton at Woolsthorpe Hall the previous century; however, the real process of discovery was more complex.[26] In fact, Darwin did not "discover" evolution at all, as popularly imagined.

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[25] Darwin did discuss the implications of evolution for human beings in *The Descent of Man, and Selection in Relation to Sex* (London: John Murray, 1971).

[26] The (retrospective) simplicity of evolution through natural selection caused Thomas Henry Huxley to exclaim, "How extremely stupid not to have thought of that!" Leonard Huxley, *The Life and Letters of Thomas Henry Huxley*, Vol. 2 (London:

Others had proposed evolution numerous time before. Darwin's contribution was to elucidate the mechanism that made evolution function: natural selection. The "father" of evolutionary thinking was in fact eighteenth-century French Naturalist Georges-Louis Leclerc, known as the Comte du Buffon. Buffon theorized a nonbiblical explanation of earth's history (he believed that a comet struck the sun, causing the release of debris that formed into the solar system's planets), and the transformation of species in response to climate change as the earth cooled over time. Buffon, however, did not provide evidence for his theory or explain how, exactly, a species changed over time, so evolution remained outside respectable science.

Despite its lack of credibility, iconoclastic thinkers continued to dream about evolution. One of these men was none other than Charles Darwin's grandfather, Erasmus Darwin. The elder Darwin enjoyed a successful career as a doctor (King George III asked him to be his personal physician), yet he found his greatest joy inventing and writing poems. In his most influential work, *Zoonomia,* which is a fascinating blend of science and poetry, he speculated about the evolution of all the earth's species from a single organism:

> Would it be too bold to imagine, that in the great length of time, since the earth began to exist, perhaps millions of ages before the commencement of the history of mankind, that all warm-blooded animals have arisen from one living filament.[27]

Like Buffon before him, however, the elder Darwin failed to explain how evolution occurred, relegating his theories to the realm of faith rather than science. It would be Jean

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Macmillan, 1900), 189.

[27] Erasmus Darwin, *Zoonomia* 1 (London: St. Paul's Churchyard, 1794), 509.

Baptiste Lamarck, the French naturalist and soldier (a combination you don't see much these days) who provided the first explanation.

Lamarck claimed that animals evolved by inheriting the characteristics their parents developed in their lives. A favorite example of his was a giraffe's long neck. According to Lamarck, this trait is the result of generations of giraffes stretching to reach the leaves on tall branches. Essentially, he viewed changes in phenotype as the by-product of effort. Unfortunately for Lamarck, his theory came just as Napoleon established his dictatorship and the espousal of change as a means towards positive growth was dangerously close to a justification for revolution. Much better, from the perspective of an establishment determined to uphold the status quo, was Georges Cuvier's argument that "any basic changes in an animal would wreck internal organization and upset the delicate balance established by the Creator between an animal and its milieu."[28] Cuvier, who was Europe's preeminent scientist by this time and firmly ensconced within the corridors of power, held great contempt for the theory of evolution and he used his authority to discredit Lamarck.[29]

Despite these repeated failures to establish a secure foothold in scientific respectability, evolutionary ideas were clearly "in the air" by the time young Darwin set foot on the Beagle. What had been missing from previous theories of evolution was a

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[28] Robert Richards, *Darwin and the Emergence of Evolutionary Theories of Mind and Behavior* (Chicago: University of Chicago Press, 1987).

[29] Opposed scientifically and politically throughout their careers, Cuvier and Lamarck's rivalry took an ugly personal turn after Lamarck's death in 1829 when Cuvier wrote a eulogy so savage and disrespectful that it is hard to read almost two hundred years after the fact.

sound explanation for *how* it occurred. It was one thing to claim that a species changed over time—Buffon had said as much in the mid-eighteenth century—but it was another to articulate the mechanism that actually drove the change. Lamarck had tried, but he met tremendous political opposition. Further, his reliance on an indiscernible "inner drive" to evolve simply did not meet the acceptable criteria of nineteenth-century European science. As inheritors of a Newtonian worldview, Darwin's contemporaries required scientific theories to be based upon simple, uniform laws.[30] So, how did Darwin provide clarity to the existing morass? How did he discover a scientific explanation for the phenomena his grandfather could only hint at? For this critical insight, he was inspired not by other biologists, but by geologists, economists, and even the animal breeders from his hometown.

Nineteenth-century geology was divided into two starkly opposed camps: catastrophism and uniformitarianism. Catastrophists believed that the earth had experienced abrupt, episodic catastrophes (hence the name) throughout its history. From this point of view, mountains burst suddenly from the plains and massive earthquakes transformed the land and sea. The leading catastrophist, Georges Cuvier, developed the argument as an explanation for the mass extinctions he and others were beginning to discover in the fossil record. Intellectuals who wanted to affirm God's presence in the natural world were drawn to naturalism because violent, powerful transformations seemed to imply a higher power. In England, geologists William Buckland and Robert Jameson argued that catastrophism provided scientific support for the veracity of Noah's

[30] David Depew and Bruce Weber, *Darwinism Evolving: Systems Dynamics and the Genealogy of Natural Selection* (Cambridge: MIT Press, 1997), 66.

flood.[31]

Uniformitarians interpreted the geologic record quite differently. Led by Charles Lyell, a Scottish lawyer-turned-geologist, the uniformitarians emphasized natural law and gradual processes that took place over a long time. According to Lyell, the forces acting upon the earth today, such as wind erosion and sedimentation, were the same forces that acted upon the earth in the past. He arrived at uniformitarianism after studying under the catastrophist William Buckland at Oxford and becoming disenchanted with his mentor's supernaturalism. Determined to practice respectable, Newtonian science, the young scholar turned to the work of James Hutton, a Scottish famer who had proposed a perpetually changing and ancient earth almost fifty years earlier. Hutton gave Lyell the theoretical tools to examine the European landscape in a new way, and he eventually discovered evidence that mountain valleys were carved by nothing more than the constant force of wind and water.

As a student at Cambridge, Darwin was steeped in catastrophist ideology due to the conservative nature of the institution, but it was Lyell who influenced him more due to the great geologist's emphasis on natural laws rather than divine intervention. In fact, when Darwin set off on his voyage to the Galapagos aboard the Beagle, he spent many of his long hours at sea soaking up the uniformitarian perspective in Lyell's "Principles of Geology." An early example of Lyell's role in Darwin's intellectual development can be seen in Darwin's 1842 theory of the formation of coral reefs. Previously, naturalists explained the beauty and apparent design of coral reefs as the work of a divine creator.

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[31] William Buckland, *Geology and Mineralogy as Exhibiting the Power, Wisdom, and Goodness of God,* Vol. 1, 4th edition (London: Bell & Daldy, 1869).

Darwin recognized that if one assumed that the land near water's edge was slowly subsiding, it was possible to predict quite unusual coral patterns, such as atolls, that formed rings around now submerged islands. Eventually, Darwin would discern uniformitarian changes occurring in animals as well: "As natural selection acts solely by accumulating slight successive favorable variations, it can produce no great or sudden modifications; it can act only by very short and slow steps."[32]

After returning from his voyage aboard the *Beagle*, Darwin spent long hours studying the literature of animal breeding and talking with experts about the subject. It was this exposure to the willful manipulation of domestic animals' traits that caused him to recognize the central importance of selection in speciation, and to seek its mechanism in nature. He explained the connection in his autobiography, "by conversation with skillful breeders and gardeners, and by extensive reading… I soon perceived that selection was the keystone of man's success in making useful races of animals and plants. But how selection could be applied to organisms living in a state of nature remained for some time a mystery to me."[33] Some scholars have minimized the importance of animal breeding on Darwin's thinking because he does not mention it in his notebooks, and also, perhaps, because animal breeding is too "dirty" to include in the rarified air of intellectual discovery. However, it is reasonable to assume that the artificial breeding of animals sincerely influenced Darwin, as many of his friends bred dogs and horses and he would

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[32] Charles Darwin, *On the Origin of Species by Means of Natural Selection or the Preservation of Favored Races in the Struggle for Life* (London: John Murray, 1859), 471.

[33] Charles Darwin, *The Autobiography of Charles Darwin* (London: Collins Publishing, 1958), 119.

have been exposed to their thoughts on the matter throughout his life. Further, if we take Darwin's word on the subject, and there is no reason not to, he explicitly acknowledges his intellectual debt: "I came to the conclusion that selection was the principle of change from the study of domestic productions."[34]

Economic theory was the final, critical influence on Darwin. As an educated Englishman with an ecumenical mind, he was well read in disciplines outside his primary field, and in the course of these investigations he came across the work of the pessimistic cleric and economist, Thomas Malthus. By the turn of the nineteenth century, some of the optimism surrounding Adam Smith's concept of the free market had started to wane, as the realities of mass poverty and the abuses of industrial labor became hard to reconcile with the maxim that self-interest benefited everybody. In *An Essay on the Principle of Population,* Malthus depicted the harsh reality of unfettered competition. He argued that, while the food supply could only grow geometrically, the population would grow exponentially due to the "passion between the sexes," and thus famine was an inevitable aspect of society.[35] In other words, poverty was natural, which made social reforms a waste of time and resources. When, in 1838, Darwin read Malthus, the elder economist's ideas shook him to the core:

> Fifteen months after I had begun my systematic enquiry, I happened to read for amusement Malthus on Population, and being well prepared to appreciate the struggle for existence which everywhere goes on, form long-continued observation of the habits of animals and plants, it at once struck me that under these circumstances favorable variations

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[34] Quoted in Ernst Mayr, *One Long Argument: Charles Darwin and the Genesis of Modern Evolutionary Thought* (Cambridge: Harvard University Press, 1991), 83.

[35] Thomas Malthus, *An Essay on the Principle of Population,* 6th edition (London: John Murray, 1826), I.IV.3.

> would tend to be preserved, and unfavorable ones to be destroyed. The result of this would be the formation of new species. Here, then, I had at last got a theory by which to work.[36]

The theory he alludes to is none other than the theory of natural selection. Finally Darwin had found an explanation for evolution. He was ready to send shockwaves through a scientific establishment still largely committed to viewing life on earth as part of a divine plan—if that is indeed what he wanted.

Having found his "theory by which to work," Darwin did not publish *On the Origin of Species* until 1859. The untimely delay begs the question "Why?" Scientists fiercely compete for original ideas and Darwin was clearly doing groundbreaking work. The answer, it appears, was Darwin's personality. A shy, mild-mannered country gentleman, he was reluctant to publish a controversial work that would undoubtedly bring tremendous strife into his and his devout wife's lives.[37] Newton and his predecessors, the "giants" whose shoulders he stood upon to peer into the laws of gravity and movement, had effectively removed the immediate influence of God from the universe. The heavens were no longer a place of mystery and divine intervention once it became known that planets and stars obeyed the same universal laws that operated on earth. If God did exist in the night sky, it was only as a "watchmaker," one who set things into motion and remained distant. For Darwin's peers, the vast majority of whom were deeply religious, the relegation of God to the sidelines in astronomical matters was as secular as they were

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[36] Charles Darwin, *The Autobiography of Charles Darwin 1809-1881*, ed. Nora Barlow (New York: W. W. Norton & Company, 1993), 120.

[37] In a letter to his friend and fellow scientist, Joseph Dalton Hooker, Darwin said that publicly denying the immutability of species was "like confessing a murder." Darwin Correspondence Project, "Letter no. 729," accessed on 1 August 2016, http://www.darwinproject.ac.uk/DCP-LETT-729

willing to go; it was simply imperative that God remained an active, involved presence in life on earth.

So, what caused Darwin to finally put pen to paper and face the inevitable scrutiny? It was a letter from a young, relatively unknown naturalist named Alfred Wallace who had contacted Darwin seeking feedback on a manuscript he had written. Like Darwin before him, Wallace was conducting research on exotic islands (Darwin in the now famous Galapagos off the coast of Ecuador and Wallace in the Maluku Islands, an archipelago in what was then the Dutch East Indies). Wallace had also read and been strongly influenced by the works of both Thomas Malthus and Charles Lyell. Further, much as Darwin had been exposed to early evolutionary theories by his grandfather and Lamarck before setting sail on the *Beagle*, Wallace began his research with a pre-existing belief in evolution due to his favorable reading of Robert Chambers' largely discredited exposition on evolution, the *Vestiges of Natural Creation*:

> I have a rather favourable opinion of the *Vestiges* ... I do not consider it a hasty generalization, but rather as an ingenious hypothesis strongly supported by some striking facts and analogies, but which remains to be proven by more facts and the additional light which more research may throw upon the problem.[38]

Much to Darwin's surprise, Wallace's letter revealed that his faith in evolution and his reading of Malthus and Lyell had conditioned him to induce the same remarkable insight as Darwin: the theory of natural selection.[39]

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[38] Michael Shermer, *In Darwin's Shadow: The Life and Science of Alfred Russell Wallace* (Oxford: Oxford University Press, 2002), 54.

[39] Thankfully, Wallace described the historic moment when he theorized natural selection, "At the time in question I was suffering from a sharp attack of intermittent fever, and every day during the cold and succeeding hot fits had to lie down for several

Wallace's "On the Tendency of Varieties to Depart Indefinitely from the Original Type." expressed views so similar to Darwin's that the elder biologist wrote in despair, "I never saw more striking coincidence; if Wallace had my M.S sketch written out in 1842, he could not have made a better short abstract!"[40] Aghast at the similarity and obvious ethical dilemma, Darwin did not know how to respond. He wanted to do what was right and credit the young scholar's discovery, but he also felt the pang of possibly having his life's work credited to someone else. He lamented, "There is nothing in Wallace's sketch which is not written out much fuller in my sketch copied in 1844, & read by Hooker some dozen years ago…but as I had not intended to publish any sketch, can I do so honourably because Wallace has sent me an outline of his doctrine? —I would far rather burn my whole book, than that he or any other man should think that I had

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hours, during which time I had nothing to do but to think over any subjects then particularly interesting me. One day something brought out my recollection Malthus's "Principles of Population," which I had read about twelve years before. I thought of his clear exposition of "the positive checks to increase"-disease, accidents, war, and famine-which keep down the population of savage races to so much lower an average than that of more civilized peoples. It then occurred to me that these causes or their equivalents are continually acting in the case of animals also…it suddenly flashed upon me that this self-acting process would necessarily improve the race, because in every generation the inferior would inevitably be killed off and the superior would remain—that is, the fittest would survive." Alfred Russell Wallace, *My Life: A Record of Events and Opinions* (Cambridge: Cambridge University Press, 2011), 360-361.

[40] Darwin Correspondence Project, "Letter no. 2285," accessed on 1 August 2016, http://www.darwinproject.ac.uk/DCP-LETT-2285

behaved in such a paltry spirit."[41]

In the end, his friends Charles Lyell, the geologist, and Joseph Hooker, a famous botanist, arranged to have Wallace's paper and Darwin's early sketches on evolution read together at a meeting of Linnaean Society on July 1st, 1858. Wallace was on the other side of the world at the time and could not be contacted before the meeting, but he never expressed any bitterness toward the arrangement. A poorer man, and of considerably less standing in the scientific community, perhaps he felt grateful to simply have his work discussed alongside Darwin's. I feel it is important, however, to credit the man himself and not solely his circumstances for the humble relinquishment of his claim to the discovery of natural selection. Wallace deserves recognition as a genuinely kind man motivated by a selfless love of learning and the desire to help others. Whatever the reason, he assuaged Darwin's lingering guilt in their personal correspondence, "As to the theory of Natural Selection itself, I shall always maintain it to be actually yours and yours only. You had worked it out in details I had never thought of, years before I had a ray of light on the subject, and my paper would never have convinced anybody or been noticed as more than an ingenious speculation, whereas your book has revolutionized the study of Natural History, and carried away the best men of the present age."[42]

When Darwin did publish *On the Origin of Species* in 1859 it was not only

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[41] Darwin Correspondence Project, "Letter no. 2294," accessed on 1 August 2016, http://www.darwinproject.ac.uk/DCP-LETT-2294

[42] Darwin Correspondence Project, "Letter no. 4514," accessed on 1 August 2016, http://www.darwinproject.ac.uk/DCP-LETT-4514

biologists and other natural scientists that took notice; an extraordinary range of intellectuals wrestled with the implications of evolution for Darwin had truly changed the intellectual landscape of the world and many previously accepted views were now subject to scrutiny. Was morality dead? Living one's life according to religious scripture seemed strangely out of place after being removed from the seat of honor in God's divine plan and unceremoniously dumped alongside the rest of earth's living creatures. And how should we govern ourselves? The debate surrounding the political implications of Darwinism divided roughly between those who believed inequality and hierarchy to be good, or at least inevitable, and those who desired a society of equals.[43] What wasn't up for debate, however, was whether or not evolution held profound implications for society, for, unlike the sociobiology debates of the 1970s, which pitted advocates of an evolutionary perspective against those who insisted on strictly cultural analyses, the thinkers of this time agreed that evolution should inform their arguments. Indeed, to be an intellectual during the Gilded Age meant addressing the work of Charles Darwin.

The most eloquent defender of a "natural" hierarchy among people was Herbert Spencer. One of the last polymath geniuses, Spencer became an expert in every subject he touched: anthropology, literature, biology, psychology, sociology, ethics, and political science. It was his contributions to philosophy, however, which earned him his

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[43] The practice of labeling someone "left" and "right" began during the French Revolution, when supporters of the crown sat on the right side of the 1789 National Assembly and those who supported the revolution sat on the left. In essence, the two positions represented those who wanted to conserve the status quo and those who wanted to progress toward something better. This is a fairly accurate description of the opposing sides in the evolution debates that took place in around the turn of the twentieth-century, so I will use those terms when discussing that debate.

tremendous fame across the English-speaking world. In *System of Synthetic Philosophy* he argued that natural laws governed every aspect of the universe and thus all existing academic disciplines could be unified (this is what made his philosophy "synthetic"). Further, he claimed that the progressive character of these laws meant that human society was inexorably evolving toward perfection. Progress in Spencer's schema, unfortunately, came with a price, as the pitiless "survival of the fittest" would "cull the herd" of less capable members of society, leaving behind only the best and brightest people.[44] Those in power, who tended to be white men, eagerly adopted Spencer's views on the evolution of society as scientific justification for the economic inequality and racism of the times.

Cynically, it could be said that the elite lauded Spencer because he echoed their beliefs back to them in a gratuitous display of self-congratulation. In other words, he became their champion by telling them what they wanted to hear. The historian Perry Miller argued as much: "undoubtedly the main reason for the appeal of Spencer to so many Americans" was his injunction that "competitive America of 1870s should continue to be just what it was, and nobody should complain."[45] From this point of view Spencer can be seen as the mouthpiece for conservative politics and a defender of the status quo. A more balanced view, however, recognizes that Spencer's popularity transcended politics, that he became "America's philosopher" because he legitimized the Victorian faith in progress, accountability, and a comprehensible universe operating by natural laws. As immigration, racial strife, and a growing, tumultuous corporate economy made

[44] Although often attributed to Darwin, the phrase "survival of the fittest" was actually coined by Herbert Spencer.

[45] Perry Miller, *American Thought: Civil War to World War I* (New York: Rinehart & Company, 1954), xxiii.

the world increasingly unrecognizable, Spencer reassured people that the country was not falling apart, as many feared, but simply experiencing growing pains towards a better future. There was no need to panic, for America was evolving, and "evolution can end only in the establishment of the greatest perfection and the most complete happiness."[46]

Spencer had a tremendous influence on America's "most vigorous and influential social Darwinist," William Graham Sumner, who became convinced that the foundation of human society was the man-land ratio.[47] Sumner argued that competition among people was inevitable considering that population increases faster than available resources. And if that were so, what should be done? Unflinching from the cold, hard reality before him, Sumner championed minimal government as the right response. He believed government intervention in public affairs would disrupt fair competition and unduly hinder the "fittest" members of society. Yes, the poor and the weak would suffer, but artificial attempts to circumvent nature's cruelty would hinder man's evolution and progress. Ultimately, according to Sumner, man's activities were governed by the same natural laws as evolutionary biology and it would be foolish to legislate counter to this reality.

Sumner argued that selfish interests motivated people and that competition led to progress. An active government which interfered "with natural laws could only lead to disastrous consequences; perhaps it would even push the hands of the clock of progress

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[46] Herbert Spencer, *First Principles* (New York: Elibron Classics, 2000), 486.

[47] William Graham Sumner, *War and Other Essays* (New Haven: Yale University Press, 1881).

backward."[48] Sumner articulated his theory of minimal government most clearly in the essay "The Absurd Effort to Make the World Over." His basic premise was that the government had to choose between liberty and progress at the price of inequality, or authoritarianism and decline for the benefit of equality. For Sumner, the choice was clear: inequality must not stand in the way of progress, for "human progress is at bottom moral progress."[49] By allowing hard-working Protestants to succeed without the interference of a meddling government, the United States could evolve into a utopia of morality and efficiency.

Conservative thinkers had convincingly argued that that economic inequality corresponded with eternal natural laws. Instead of being seen as part of a political agenda, a small government indifferent to the needs of its poorest citizens was viewed as an unbiased means for facilitating progress through competition. American philosopher John Fiske, for example, "tied the system to God's cosmic destiny."[50] By the turn of the century, a large number of Americans "believed in the widest possible extension of the principle of private property, and the narrowest possible restriction of state interference, except to aid private property to increase its gains."[51] Spencer and his disciples eventually convinced so many people that laissez faire economics began to be written into the

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[48] George Cotkin, *Reluctant Modernism: American Thought and Culture, 1880-1900* (Lanham: Rowman & Littlefield Publishers, 1992), 38.

[49] Richard Hofstadter, *Social Darwinism in American Thought* (Boston: Beacon Press, 1992), 61.

[50] Robert Wiebe, *The Search for Order, 1877-1920* (New York: Hill and Wang, 1967), 135.

[51] Charles Beard, *Contemporary American History, 1877-1913* (New York: The MacMillan Company), 53.

Constitution (In *Lochner* v. *New York* the Supreme Court ruled against a law in New York limiting the number of hours a baker could legally be required to work. The justices' logic: freedom of contract trumped considerations of fairness.[52]).[53]

For contemporary readers who have not explored the intellectual history of evolution, the impact of Darwin on social theorists can be summed up in two words, "Social Darwinism," yet the Left was an equal contestant in the claim for Darwinian sanction at the turn of the century.[54] An early, powerful voice for leftist evolutionary thinking was Peter Kropotkin, a Russian anarchist whose heroic exploits and sincere commitment to the betterment of the world caused the sardonic wit of the times, Oscar Wilde, to sincerely pen that Kropotkin was a "beautiful white Christ" and "one of the

[52] Justice Oliver Wendell Holmes provided a blistering dissent in this case, arguing that "The Fourteenth Amendment does not enact Mr. Herbert Spencer's Social Statics." Lochner v. New York, 198 U.S 45, 75-76 (1905).

[53] Spencer and his disciples did not plant the seed of laissez faire governance on American soil, but they helped it grow into an intellectually respectable perspective. The doctrine first gained prominence during the presidency of Andrew Jackson, who worked tirelessly to dismantle the national bank. Jacksonians believed government projects of the sort proposed by Henry Clay benefitted the Northeast elite at the expense of the common man. Later, during Reconstruction, a generation of white Southerners would come to resent the influence of Big Government in the form of a military occupation. Thus, Spencer and Sumner's teachings are best seen as validation for a pre-existing faith in small government.

[54] There are two primary reasons for this simplified view. The first is the disproportionate influence Social Darwinism had on public policy in the early twentieth-century—a subject we will address in depth later in the chapter. The other reason is the remarkable Richard Hofstadter, a professor of history at Columbia University whose *Social Darwinism in American Thought* stands alongside his other great works as testaments to his ability to craft lasting narratives of American history. Hofstadter wrote captivating books that analyzed intellectual issues of an epic scale, yet the grand scale of his analyses meant that many of the details were inevitably left out. In the case of evolutionary thinking at the turn of the twentieth-century, one of the more interesting, and important, details the eminent professor left out was the vocal appropriation of Darwin by the left.

most perfect lives I have come across in my own experience."[55] The son of nobility, his mother the daughter of a prominent general and his father a prince, as a youth Kropotkin worked as a page for Czar Alexander II, whom he witnessed liberate the serfs in 1861. Before long he was promoted from page to a position in the army, and he took this opportunity to join two sweeping geographical survey expeditions that explored North Manchuria. It was a massive undertaking, spanning over fifty thousand miles of extremely challenging environments, but Kropotkin was not daunted. In fact, he could barely conceal his excitement to be following in the footsteps of his hero, Alexander von Humboldt, who had explored the South American wilderness years before and stood as the embodiment of the humane, Western intellect.

Kropotkin had already read *On the Origin of Species* before he set out on his journeys and he looked forward to studying natural selection in the Russian wilderness, where he fully expected to witness brutal competition among members of the same species. Nature "red in tooth in claw" was the seemingly necessary condition in which natural selection could take place; however, what he saw was quite different. After years of carefully observing migrating birds, mammals, fish, and insects, Kropotkin became convinced that cooperation, not competition, was the defining characteristic of life in the wild. True there was a struggle for survival, but this struggle pit groups of animals against a hostile environment, not members of the same species against themselves. In the unforgiving Russian tundra, Kropotkin "saw mutual aid and mutual support carried on to an extent which made me suspect in it a feature of the greatest importance for

[55] Oscar Wilde, *The Complete Works of Oscar Wilde* (Oxford: Oxford University Press, 2005), 185.

maintenance of life, the preservation of each species and its further evolution."[56] And the cooperation he witnessed was not confined to wild animals; the peasants in the small Siberian villages enjoyed a strong sense of community and thoughtlessly lent assistance to their neighbors.

After his experience in the Russian wilderness, Kropotkin, a Russian nobleman whose heart and mind still soared with the radical republicanism of the day, began to suspect that British thinkers had a skewed view of evolution due to the industrialization of their nation. The cutthroat competition Malthus believed to be inevitable was actually an anomaly produced by the centralization of power in the hands of factory owners. Real life, the kind found in the vast expanses of nature and in human communities unsullied by powerful governments and militaries, favored those who practiced mutual aid. Radicalized by these insights, Kropotkin resigned from the army and committed himself to science and political activism, a decision that cast him from the inner circle of Russian privilege and landed him in multiple prisons. Despite the hardships, he maintained the conviction until the end of his life that "animal societies are best organized in the communist-anarchist manner."[57]

Kropotkin returned to Russia following the February Revolution in 1917, greeted by tens of thousands of people. Within a few months, however, the Bolsheviks seized power in the October Revolution, disillusioning the now elderly man who despised the

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[56] Peter Kropotkin, *Mutual Aid*, xii.

[57] Daniel P. Todes, *Darwin Without Malthus: The Struggle for Existence in Russian Evolutionary Thought* (New York: Oxford University Press, 1989), 131.

communists' authoritarian methods.[58] Yet evolutionary thinking and communism were not necessarily oil and water. Karl Marx and Friedrich Engels both read *On the Origin of Species* and held the work in high regard. In fact, Marx wrote to Engels that evolution "contains the basis in natural history of our view."[59] At this time most biologists considered themselves "natural theologians," and they studied nature in veneration of God's works. Natural theologians, who had held sway over Western minds for centuries, believed in a timeless, divine plan for nature, which gave implicit support for the idea that change would cause great havoc. In Darwin, the communists recognized an ally in the fight against the essentialist worldview, as natural selection demonstrated that change, and progress, can occur without divine intervention. For Marx and Engels, reality was not one of platonic ideals, but of development through a Hegelian dialectic that took place in concrete historical contexts. Just as there is no "evolution" outside of an environment, there is no progress outside of existing political and economic institutions. Therefore, in Marx and Engels' eyes, Darwin's scientific insights supported their claims that capitalism developed from the conditions of feudalism and that communism would emerge from the capitalism once an empowered proletariat took control of the means of production.

Engels was the more scientifically inclined of the two, although both men engaged in wide-ranging intellectual inquiry in a way that is hard to imagine today's age of academic specialization. They assiduously kept up to date with the leading scientific

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[58] When Kropotkin heard that the Bolsheviks had fired shots against the Provisional Government, he is said to have exclaimed, "They are burying the Russian revolution!"

[59] Karl Marx and Friedrich Engels, *Selected Correspondence: 1846-1895* (New York: International Publishers, 1936), 109.

developments out of intellectual curiosity and, more importantly, because they believed there to be only one true science, which meant that for communism to be legitimate it had to be scientifically sound. From their perspective, distinct categories such as "philosophy" and "science" were arbitrary and ultimately false. In 1844, Marx wrote in his notebook, "Natural science will, in time, incorporate into itself the science of man, just as the science of man will incorporate into itself natural science: there will be *one* science."[60] The next year, in *The German Ideology*, Marx and Engels similarly remarked, "We know only a single science, the science of history. One can look at history from two sides and divide it into the history of nature and the history of men. The two sides are, however, inseparable; the history of nature and the history of men are dependent on each other so long as men exist."[61] It was this faith in the consilience of knowledge that led them to receive Darwin's work so warmly. They finally had the scientific backing for their political project they had been looking for.

Still, the marriage between communism and evolution was not free of disagreement. In particular, Marx distrusted the implications of a universal human nature, which seemed a logical corollary to evolution. Marx certainly recognized that humans were animals that had evolved over time, and that speciation through evolution had led to a "human nature" that could be considered universal. (In fact, one productive way of viewing *Kapital* is as a critique of man's estrangement from his essential nature through the alienation from his labor.) But he also believed that man "acts upon nature and

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[60] Karl Marx and Friedrich Engels*, Marx-Engels Collected Works,* Vol. 3 (Moscow: Moscow Progress Publishers, 1975), 303-304.

[61] Karl Marx and Friedrich Engels, *Marx-Engels Collected Works,* Vol. 5, 28.

changes it, and in this way he simultaneously changes his own nature."[62] In essence, human beings had become so powerful as to transcend their animal heritage. The world in which humans lived was a human, not a "natural" world. To understand the human condition, therefore, one has to study history, not biology. Human beings' dramatic departure from the animal world meant that evolution, while still correct and important, is best seen as metaphysical support for a dynamic, revolutionary world and not as a source of knowledge for human affairs.

In some ways socialism was a better fit for Darwinism. As previously mentioned, communists appreciated Darwin's contribution to the attack on essentialism, which had long been held as the logic of God's plan and the argument against change in nature or politics; however, communist ideology also required a dramatic and purposeful shift, a revolution, from the normal course of affairs in order to become fully realized. In this way communism was better suited, ironically enough, to the catastrophist thinking of the staunch conservative Cuvier and his disciples. Socialism, on the other hand, required no such deviation from normal processes. Like evolution, it is predicated on the assumption that change itself *is* reality. As Heraclitus said, "you can not step twice into the same river."[63] The logical affinity between socialism and evolution makes it unsurprising that one of the founders of natural selection, Alfred Wallace, declared himself a socialist in

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[62] Later, the Marxist biologist Richard Lewontin would carry the mantel for Marx's concept of an interdependent relationship between humans and nature. Karl Marx, *Capital: A Critique of Political Economy,* Vol. 1 (London: Penguin Books, 1976), 283.

[63] Charles H. Kahn, *The Art and Thought of Heraclitus: An Edition of the fragments with translation and commentary* (Cambridge: Cambridge University Press, 1979), 168.

1889 after reading Edward Bellamy's *Looking Backward*.[64]

Those skeptical of a purported link between socialism and evolutionary theory can point to Darwin's statement in 1877 that "(a) foolish idea seems to prevail in Germany on the connection between Socialism and Evolution through Natural Selection" as evidence for their perspective. [65] And, while argument from authority is a well-known logical fallacy, it is hard at first glance to maintain that there exists a connection between Darwinism and Socialism if Charles Darwin himself is saying there is none. Digging a bit deeper, however, reveals a remarkable paradox: from a modern perspective Alfred Wallace was more "Darwinian" than Darwin. (By that I mean Wallace was the true early champion of Darwin's greatest insight, natural selection, as the sole mechanism for evolution.) Darwin himself believed, as did Herbert Spencer and many other prominent evolutionary thinkers at the time, that inherited characteristics, or "Lamarckism," also played a key role in evolution. In fact, challenges to Darwinism such as the blending of heritability caused almost all scientists by the 1880s to accept evolution but to deny natural selection.

Not Wallace. In 1889 the humble co-discover of natural selection wrote a book titled *Darwinism* in which he defended the tenets of natural selection as the driving force of evolution. Wallace was also the first to person to apply evolutionary thinking to the study of humans, arguing against racial inequality in "The Origin of Human Races and

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[64] Peter Raby, *Alfred Russel Wallace: A Life* (Princeton: Princeton University Press, 2001), 255.

[65] Darwin Correspondence Project, "Letter no. 12370F," accessed on 2 August 2016, http://www.darwinproject.ac.uk/DCP-LETT-12370F

the Antiquity of Man Deduced from the Theory of 'Natural Selection."[66] As Wallace explored the implications of evolution for man he became convinced that humans had entered a new chapter of development, that we had reached a point of intellectual development where we responded to the environment through our minds, not our bodies. When faced with harsh winters or fierce animals humans don't get fatter or stronger; they make fires, stitch coats, and use weapons. Wallace concluded that human beings had entered a new chapter in their evolution and now thrived in direct accordance with their levels of intelligence and cooperation. Those were the characteristics being selected for in the new human environments and Socialism embodied them both.

Wallace believed that evolution and socialism were passive articulations of reality, not a call to action. For this reason, socialists constantly disappointed their political cousins, the communists, who believed that historical developments had evolved to create the conditions for revolution, but who also felt it was necessary to fight to achieve their political ends. Socialists held many of the same critiques of capitalism as the communists—it's just that they did not see the point in fighting to achieve what was inevitable anyway. The work of Laurence Gronlund, a Danish-born lawyer who tirelessly championed socialism in the United States, illuminated socialism's distinct political strategy. He writes, "As collectivists, we do not approve of the violent methods of the (communists). We want the gradual absorption of all capital by the government in a peaceable manner."[67] And, making the connection between Darwinism and his politics,

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[66] Alfred R. Wallace, "The Origin of Human Races and the Antiquity of Man Deduced from the Theory of "Natural Selection"" *Journal of the Anthropological Society of London* 2 (1864): Clviii-lxxxvii.

[67] *Salt Lake Herald* 50, no. 129 (Oct. 11, 1894), 2.

"this movement is evolutionary, not revolutionary."[68]

Socialists' optimism for the future rested in large part on their understanding of evolution, which was Lamarckian. This was a good fit for socialists because it was the prevailing model for "soft inheritance," a term coined by the evolutionary biologist Ernst Mayr. Soft inheritance means that organisms pass on characteristics acquired during a lifetime to their progeny, and the implications of this theory support liberal public policy. Imagine, for example, if your children were born smarter as a result of the books you read. You would actually read all those books collecting dust on the bookshelf! Taking a broader view, Lamarckism creates an ethical imperative to provide an environment conducive to personal growth for all citizens. By doing so, it would be possible to create a healthy, enlightened populace, and to eliminate a lot of the social ills. This sounds like progress, an undeniable good, but, remember, Spencer and his disciples had their own arguments for progress

As diverse thinkers attempted to use evolutionary theory to support their vision for progress, it was perhaps inevitable that they would find themselves adopting scientific positions that aligned with their personal values and beliefs. Politically liberal people, for example, favored soft inheritance because of its implications for the betterment of society. Conversely, those who favored centralized power and a hierarchical social organization favored "hard inheritance," another term Ernst Mayr coined, which is defined as the antonym of soft inheritance. (In other words, offspring are *not* born with

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[68] *The Morning Call* 77, no. 35 (Jan. 4, 1895),12.

their parents' acquired characteristics.) Conservatives believed in hard inheritance because it supported their notion that life was a competition between dissimilar people, and that there were those naturally fit for positions of power.[69] True, many of these men and women were proud supporters of the American republic who disdained the monarchy, but this was primarily because in their minds a royal hierarchy was artificial. To find out who was truly superior it was necessary for people to compete freely, without governmental interference. The result, they believed, would be a meritocracy of the kind the Founding Fathers of the country envisioned.

From one angle it appears that the intellectuals of the late nineteenth century were destined to participate in an endless, Sisyphusian tug-of-war. Equality or hierarchy? Big or small government? Since the Enlightenment, intellectuals had fought over these questions in various forms and to this day one can find reasonable company in either camp. What differentiated the early debates on evolution and public policy, however, was their intimate connection to science. Because the mechanism of evolution was uncertain, social theorists were able to choose the particular theory of evolution that best suited their arguments. And, while this freedom of choice gave them more custom-fit scientific backing for their views, it also tied their hands in a way quite dissimilar to typical arguments in the social sciences and humanities—which often end in an unsatisfying agreement to disagree due to the inherent subjectivity of the subject matter. By tying their

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[69] For many people, science is the last bastion of objectivity and it is hard to see how political values could wiggle their way in to a subject like genetic reproduction. An open-minded consideration of vaccines, genetically modified foods, "fracking," stem cell research, and global warming reveal just how enmeshed personal perspectives are with scientific debate even today.

social theories to scientific ones, the liberals and conservatives of the time had essentially forfeited their prerogative to accept their disagreement as simply a difference of opinion. In their circumstance, if biologists proved that one of the evolutionary theories was incorrect, the social theories derived from that perspective would lose credibility as well. And that is exactly what happened.

August Weismann was born in Frankfurt, Germany in 1834, the middle class son of a teacher. His boyhood curiosity led him to study music, painting, and, his favorite subject of all, butterflies. For financial reasons he chose to be a doctor rather than a scientist, but after achieving success as the Chief Medic during the Second Italian War of Independence and working as the personal physician to Archduke Stephen of Austria, he followed his childhood calling and became a professor of biology at the age of twenty-nine. Initially, Weismann, like Darwin and many other prominent scientists of the time, believed Lamarckism played an important role in evolution, but his German colleagues had begun to make groundbreaking discoveries about the structure and function of cells and these developments caused him to reconsider.[70]

The key insight for Weismann's contribution to evolutionary biology was the recognition of the distinction between gametes (sex cells like sperm or eggs) and somatic cells, which comprise all the remaining cells of the body. Weismann called gametes "germ" cells, and he postulated that they alone were responsible for inheritance. There was, in effect, a "Weismann barrier" that precluded the somatic cells from having any influence over the gametes, which eliminated the possibility that changes in one's brain

[70] These German scientists discovered the existence of chromosomes and learned how cells divide. Their efforts established cytology, the study of cells.

cells or muscle cells, for example, could be inherited. In 1893, Weismann first published these views, labeling them his "germ plasm" theory.[71]

Skeptics railed against Weismann's theory, claiming that without the inheritance of acquired characteristics there simply wasn't enough differentiation among individuals to allow natural selection to function. To these arguments, Weismann responded that sexual selection provided the necessary individual distinctions, which, in turn, set off another round of denunciations, as most biologists of the time, working before the rediscovery of Gregor Mendel's work on genes, believed that sexual procreation blended parent phenotypes and thus prevented, not facilitated, individual differentiation. Weismann, however, privy to the latest research on gametes being done by his German colleagues, knew that maternal and paternal chromosomes do not fuse during fertilization, but instead establish a new, unique diploid zygote. Back and forth the competing factions went until, in 1893, Weismann conducted a decisive experiment that would set the record straight.

To prove once and for all that acquired characteristics were not inherited, August Weismann concocted an ingenious, if somewhat macabre, experiment: cutting off hundreds of mice tails. How could that possibly solve the problem? Well, by systematically cutting of the tails of nine hundred and one mice over the span of several generations, Weismann was able to show that none of the progeny were born with short tails. If Lamarckism were right the removal of the mice tails should have influenced the offspring's phenotypes, but….nothing. For advocates of laissez faire governance,

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[71] August Weismann, *The Germ-Plasm: A Theory of Heredity* (New York: Charles Scribner's Sons, 1893).

Weismann's findings proved that unfettered competition was healthy for society, as it allowed naturally "superior" citizens to rise to the top and did not waste resources coddling the "inferior" citizens incapable of meaningful change.[72]

For the progressives who supported collective bargaining, racial equality, and a robust welfare state, the writing on the wall was clear, and it was not pretty. "If Weismann…. (is) right," remarked Berkeley biologist Joseph LeConte in 1891, "if natural selection be indeed the only factor used by nature in organic evolution and therefore available for use by Reason in human evolution, then, alas, for all our hopes of race improvement, whether physical, mental, or moral!"[73] Dismayed, LeConte and other social reformers found themselves pushed in a new direction following the discovery that soft inheritance was a lie. Once committed to a program of improvement for an entire nation of people, they grudgingly accepted the fact that Weismann's findings required a new course of action. Social worker Amos Warner explained, "if acquired characteristics be inherited, then we have a chance to permanently improve the race…by seeing to it that individuals acquire characteristics that is (sic) desirable for them to transmit," but in light of hard inheritance's victory, reformers must now look to "exercising an influence upon the selective process."[74] Here again is LeConte, arriving at the awful, yet logical implications of soft inheritance's demise: "if we are to have race improvement at all, the

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[72] Presumably, the people in favor of paving the road of success for "superior" people assumed that they belonged in this superior class.

[73] Joseph LeConte, "The Factors of Evolution" *The Monist* 1, no. 3 (1891): 334. http://www.jstor.org/stable/27896870.

[74] Carl Degler, *In Search of Human Nature: The Decline and Revival of Darwinism in American Social Thought* (Oxford: Oxford University Press, 1992), 24.

dreadful law of destruction of the weak and helpless must with Spartan firmness be carried out voluntarily and deliberately. Against such a course all that is best in us revolts."[75]

Eugenics, or the attempt to "improve" a population through controlled reproduction, became a popular cause for diverse thinkers at this time.[76] African-American professor W.E.B. DuBois, birth control advocate Margaret Sanger, and radical anarchist Emma Goldman, for example, all wove eugenics into their platforms. George Bernard Shaw, a socialist playwright, liked to poke fun at the trendy new way of thinking by reminding others that he, and possibly they, would have certainly been chosen "unfit"; however, he, too, saw tremendous potential in eugenics and incorporated it quite clearly into his play *Man and Superman*. The idea was not new. Francis Galton, Darwin's half-cousin coined the term in 1883, yet Weismann's denunciation of soft inheritance gave fuel to the smoldering concept, resulting in a conflagration of eugenic thought that spread across the Atlantic.[77] Before long there was a Eugenics Education Society in England and an American Eugenics Society as well as the International Federation of Eugenics Organization. Influenced by the growing intellectual support for state managed evolution

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[75] Joseph LeConte, "The Factors of Evolution," 334.

[76] Turn of the century bipartisan acceptance of eugenics puzzles modern readers because the practice fits hand in glove with a "survival of the fittest" perspective; however, in light of Weismann's findings it should be clear to the reader that almost all serious social theorists had to account for the reality of hard inheritance.

[77] Interestingly, there are two types of eugenics, "positive" and "negative," and one could be in favor of one but not the other—or both. Positive eugenics refers to intentional efforts to facilitate reproduction among the desirable citizens. Think of Singapore's subsidization of childbirth for college-educated women. Negative eugenics focuses more on preventing reproduction by citizens thought to have undesirable characteristics.

of a population, numerous governments began to implement eugenic policies—the first being Indiana state's 1907 law providing for the involuntary sterilization of "confirmed criminals, idiots, imbeciles and rapists."[78]

Although some prominent eugenicists favored "positive" eugenics, meaning the facilitation of procreation by exemplary individuals, the restriction of reproduction by supposedly lesser members of society, or "negative" eugenics, emerged as an immediately popular agenda among social reformers. Sociologist Richard Dugdale's study of the "Jukes" family (a pseudonym for a combination of four actual families) traced dozens of criminals and prostitutes to a single Dutch settler, showing the alarmingly deleterious effects of uncontrolled reproduction among the unfit. Clearly, Dugdale argued, it was imperative to prevent similar cases; however, to pursue the task effectively it was first necessary to identify who, in fact, were society's irredeemable degenerates. Not coincidentally, intelligence testing emerged as a fledgling practice concurrently with society's newly perceived need to cull its weaker members.

Harvard psychology professor Richard Yerkes's IQ tests filled this need. Now, scientists claimed, they could objectively analyze one's intelligence, making possible the identification and subsequent elimination of the unfit. The influential psychologist Henry Goddard tirelessly campaigned to apply the new technology of intelligence testing to government policy. One of his primary accomplishments to this end was the division of the intelligence spectrum into identifiable categories (From Goddard we have the term "moron," which is used loosely today as an insult, but originally referred to a specific

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[78] Daniel Kevles, *In the Name of Eugenics: Genetics and the Uses of Human Heredity* (Cambridge: Harvard University, 1985), 100.

range of intelligence scores.).[79] In *The Kallikak Family: A Study in the Heredity of Feeble-Mindedness*, he argued for widespread testing and the placing of the feeble-minded in institutions where they would be trained to perform menial labor.[80] Eventually Goddard put his theory into practice as Director of Research at the Vineland Training School for Feeble-Minded Girls, and he was far from alone in his efforts. By 1920, agencies of various sorts had forcibly sterilized over 65,000 women, the majority of whom were either Native American or African American.

Fundamental to the conscious marginalization of "inferior" citizens was the perception that pre-existing racism and gender discrimination had been given scientific sanction. To understand the facility in which "superior" was conflated with "white man" it is necessary to recognize that at the turn of the twentieth century almost all of the powerful people in the United States were white men. These men had crafted narratives to justify their privilege before the triumph of hard inheritance, but now an aura of objectivity gilded their claims of superiority. This was the beginning of the age of "scientific racism," an ignominious chapter in the history of applied science—and a prominent reason the radicals fought so hard against sociobiology.

A quick tour of the 1893 Chicago World's Fair provides a fascinating glimpse of scientific racists' "mental map." Visitors to the grounds would immediately have noticed that the fair was divided into two distinct grounds: the White City representing white

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[79] To be precise (this was science, after all) an idiot has an IQ between zero and twenty-five, an imbecile has an IQ between twenty-six and fifty, and a moron has an IQ between fifty-one and seventy.

[80] Henry Goddard, *The Kallikak Family: A Study in the Heredity of Feeble-Mindedness* (London: Macmillan Company, 1912).

men's accomplishments and the circus-like exhibit featuring the "savage" dark races. Inside the White City itself, which was designed by Daniel Burnham and Frederick Law Olmsted, were fourteen neo-classical plaster buildings featuring modern marvels such as Nikola Tesla's alternating current electricity, the original Ferris Wheel, and the first commercial movie theater. White women's achievements, while still a part of the White City, were all housed in a single small building on the periphery instead of being featured alongside their white male counterparts. This compartmentalization signified women's idealized domestic relegation in society. Outside the White City, and thus outside respectability, were numerous "native" villages.[81] These villages represented various "savage" peoples around the world, and their arrangement essentially ranked them along a spectrum of development, with the tribes of Africa occupying the lowest rung of respectability.

What strikes the modern American most about the White City's organization is not the existence of racism, but its official sanction. Most thoughtful people recognize that racism is alive and well today. To find explicit claims of white superiority, you must look to the margins, where disreputable ideas lurk in the shadows. In stark contrast, at the turn of the century, white superiority was orthodox thinking. For example, the wildly popular president Theodore Roosevelt tirelessly campaigned against "race suicide," his term for the eventual decline of the allegedly superior white race due to their low birthrate relative to immigrants and minorities. According to Roosevelt, who was an accomplished amateur historian, the great empires of the past had succumbed not to

[81] Gail Bederman, *Manliness and Civilization: A Cultural History of Gender and Race in the United States, 1880-1917* (Chicago: University of Chicago Press, 2008), 35.

military defeat but to the "watering down" of their bloodline. He argued that Rome fell because of "a change in the population…caused by the immense importation of slaves, usually of inferior races."[82] Madison Grant, the best-selling author of *The Passing of the Great Race*, explicitly drew from eugenics and Darwinism to claim that "Nordics" were the highest racial stock and that the immigration of "lesser" peoples coupled the expansion of the Black population into the urban North was undermining America's greatness.[83] According to Grant, Nordics could be identified by their "wavy brown or blonde hair and blue, gray or light brown eyes, fair skin, high, narrow and straight nose," and were destined to be "all over the world, a race of soldiers, sailors, adventurers, and explorers, but above all, of rulers, organizers, and aristocrats."[84] The orthodoxy of scientific racism, which had been made possible by the successful association of conservative politics with the theory of evolution, provided the intellectual legitimacy for discriminatory policies such as the National Origins Act of 1924 that attempted to maintain the "racial character" of the United States by forcing immigration numbers to correspond to the nation's 1890 demographics.

It is clear that, after a long struggle to determine the political implications of evolution, the triumph of hard inheritance had facilitated the dramatic rise of policies that favored a racial and gender hierarchy. To be respected as a serious intellectual meant making arguments that corresponded with Darwinism, and early twentieth-century

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[82] Theodore Roosevelt letter to Cecile Arthur Spring-Rice, August 5, 1896, in *Letters*, I, 554.

[83] Madison Grant, *The Passing of the Great Race: Or the Racial Basis for European History* (New York: Charles Scribner's Sons, 1922).

[84] Madison Grant, *The Passing of the Great Race*, 228.

scholars agreed that Darwinism implied a competition among unequal individuals that "naturally' resulted in white men's political and economic dominance. Yet this perspective is not the reality that scholars faced in the 1960s. In fact, it was almost the complete opposite. Sociobiologists and other intellectuals who attempted to analyze human behavior through an evolutionary lens faced almost universal contempt. What had happened? Well, reality abhors simplicity like nature does a vacuum, so there is no one factor to point to, but it is fair to point to four developments that caused scholars to repudiate evolutionary thinking in the social sciences: philosophical challenges, professional competition with the new branches of sociology and anthropology, rising uncertainty in the scientific community about natural selection in light of genetics, and, perhaps most importantly, the terrible legacy of Nazi Germany's race extermination policies.

THE FALL OF SOCIAL DARWINISM

Historians have known for quite some time that Social Darwinism eventually fell from favor. Incredibly, however, there are few explanations why. The seeming inevitability of its fall may have played a part in the silence: Social Darwinism was clearly influenced by the era's prevailing racism, and I imagine that people assume it was discredited along with the concept of superior races during the long march toward racial equality that took place throughout the twentieth-century. From that perspective, past scientists quickly came to see that Social Darwinism was wrong and discarded it in the trash bin of intellectual history without further ado. Social Darwinism was "bad science," an aberration, and like phrenology before it, there was no need to explain why it was no longer held in high esteem because its absurdity was manifestly obvious. I believe, however, that the true story of Social Darwinism's demise is more complex.

While it may feel good to view the fall of Social Darwinism as the triumph of good over evil, racism was alive and well long after intellectuals discredited the view of society as an organism that needed intense evolutionary competition between its members to thrive. The truth is that there were a number of factors that played a part in the demise of Social Darwinism, and morality played only a supporting role. Despite the popularity and influence of Social Darwinism, eugenics, and scientific racism, there were cracks in the ideological foundation of applied evolutionary thinking that allowed seeds

of opposition to take root. In time, Social Darwinism and the other forms of biological determinism crumbled under the attacks, leaving a new paradigm of strictly cultural analysis in its place.

The earliest challenge to biological analyses of human affairs was philosophical. In 1907, Cambridge professor Henry Sidgwick declared that attempts to prescribe human behavior from the principles of evolution committed the logical fallacy of deriving an "ought" from what "is." Yes, he argued, it is true that humans evolved and that evolution entails ruthless competition, but that does not mean people should abandon their moral commitment to others. That's like saying because warfare exists it must be good. No. Voltaire surely would have laughed at such Panglossianism; however, it was his contemporary, the great David Hume, who first identified the fallacy (which is why it is known today as Hume's Law) in his *A Treatise on Human Nature*:

> In every system of morality, which I have hitherto met with, I have always remark'd, that the author proceeds for some time in the ordinary way of reasoning, and establishes the being of a God, or makes observations concerning human affairs; when of a sudden I am surpriz'd to find, that instead of the usual copulations of propositions, is, and is not, I meet with no proposition that is not connected with an ought, or an ought not. This change is imperceptible; but is, however, of the last consequence. For as this ought, or ought not, express some new relation or affirmation, 'tis necessary that it should be observ'd and explain'd.[85]

Of course, Hume himself was not addressing the application of evolutionary science to human affairs, as he died almost a hundred years before Darwin published *On the Origin of Species*. Yet the argument remains the same, and Sidgwick believed the "gap," as he called it, between what is and what ought to be was clearly present in the flawed logic of evolutionary ethics.

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[85] David Hume, *A Treatise of Human Nature* (Oxford: Oxford University Press, 1960).

Sidgwick's student at Cambridge, G.E Moore, continued his mentor's assault on evolutionary ethics in the *Principia Ethica,* which would come to stand as one of the most influential tracts in twentieth-century philosophy.[86] In addition to violating Hume's Law, Moore claimed, any attempt to derive values from evolutionary biology committed the "naturalistic fallacy."[87] Naturalistic fallacies mistakenly attempt to deconstruct an irreducible concept such as "good" into constituent parts—parts that don't exist because the original concept cannot be further divided. For example, while it is possible to describe a car, which is a complex concept, as an assemblage of tires, doors, and engine, and so on, it is impossible to describe the color blue in a similar manner. The color blue is simply the color blue. And those who would try to express "blue" to a blind person would inevitably find themselves at a loss of words. Moore believed that those who claimed laissez faire governance and white supremacy were good because they were expressions of the "survival of the fittest" failed to recognize that they were "identifying the simple notion which we mean by 'good' with some other notion," in this case the characteristics of evolution.[88] Like the color blue, Moore argued, what is good is simply good; it has no defining characteristics.[89] For many members of the members of the philosophical

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[86] G.E. Moore, *Principia Ethica* (Cambridge: Cambridge University Press, 1903).

[87] The term "naturalistic" is somewhat of a misnomer, as it has nothing to do with nature. For this reason, some critics of sociobiology would inappropriately claim that sociobiology violated the naturalistic fallacy by assuming that everything found in nature was objectively good.

[88] Moore, *Principia Ethica*, 58.

[89]Here you can see Moore's tremendous influence on continental philosophy, as he transforms classical philosophical questions into semantic problems. Wittgenstein, who recognized Moore as a tremendous thinker, would later champion this course of

community, the cogency of Sidgwick and Moore's arguments effectively closed the door on efforts to justify public policies based on concordance with evolution.

Philosophers weren't the only intellectuals to chip away at the credibility of applied evolutionary thinking. Motivated by a complex blend of sincere progressive values and a selfish desire to carve out a niche of professional authority, members of the fledgling social sciences also began to assert that biological realities had no direct bearing on societal matters. Prior to this time, most anthropologists were wealthy amateurs whose work was meant for public consumption. The new generation, intent on becoming a respected academic discipline, had higher intellectual ambitions. Sociologists suffered from similar professional insecurity. Their discipline's founder, Auguste Comte, had posited the interdependence of all knowledge, but authority in academia was becoming increasingly tied to specialization, so they desperately needed to carve out an identity for themselves independent from the other, more established sciences. Fighting for their professional lives, the anthropologists and sociologists attacked the concept of biologically informed social sciences.

The central figure in this story was a young immigrant from Germany named Franz Boas. Born in 1858 to parents who despised the backwardness and authoritarianism of Prussia, Boas was raised to value the core principles of the Revolution of 1848: democracy, liberalism, and modernity. Initially, Boas was a physicist, but after earning his doctorate he participated in an expedition to Baffin Island in northern Canada, where

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philosophical inquiry.

he worked intimately with the Inuit people, and he decided to study indigenous people instead of abstract forces. Even at this early stage in his career, the young Boas expressed the combination of intelligence and kindness that would define his legacy. After analyzing the less materially developed Inuit, he concluded, "I often ask myself what advantages our 'good society' possesses over that of the 'savages' and find, the more I see of their customs, that we have no right to look down upon them."[90] Determined to pursue his work with indigenous cultures, and finding that his job opportunities in Germany were dwindling due to the rise of anti-Semitism, he moved to the United States and joined the Smithsonian Museum. Within a few years he joined the faculty at Columbia University and set his sights on the dominant intellectual trends of eugenics and scientific racism.

Boas' first salvo was *The Mind of Primitive Man*, where he established his enduring thesis, namely, that there is no single spectrum of development along which human beings ascended. Previous anthropologists had assumed that this was the case and subsequently concerned themselves primarily with explaining why certain peoples were more or less advanced than others. As seen in the exhibit of "savages" at the White City, post-Darwin anthropologists tended to explain these differences by referring to less technologically developed people as less evolved. Boas would have none of it. His experiences with the Inuit had proved to him that they were not lesser people in any way. That, in fact, they were incredibly well adapted to their particular environment and that the self-declared "advanced" people would quickly find themselves in dire straights were

[90] Franz Boas, quoted in George W. Stocking, *Race, Culture, and Evolution: Essays in the History of Anthropology* (Chicago: University of Chicago Press, 1968), 148.

they to find themselves in a similarly frozen and formidable environment. To argue his position, Boas reintroduced a discredited interpretation of Darwinism that had originally been proposed by natural selection's neglected second founder, Alfred Wallace.

Like Boas, Wallace had spent significant amounts of time with indigenous people and, like Boas, he had left these experiences with a deep conviction in the universal potential of human beings rather than a renewed sense of white superiority. Both men emphasized the nonteleological nature of evolution, claiming that there was no pre-determined end in the process, but instead a constant process of adaptation to particular environments. This meant that a human was not "more evolved" than a monkey; it had just evolved under different pressures.[91] From their perspective, distinctions between groups of humans could be explained the same way. The contexts in which the Inuit and other indigenous peoples found themselves caused them to take distinct, yet parallel and equal, paths of development. For the anthropologist Boas, this meant that biological interpretations of people were unhelpful. Yes, of course, humans evolved, but they had evolved to have the intelligence to manipulate their environments. This meant that what truly differentiated people was not biology, which was universal, but culture.

The next year (he was a prolific writer), Boas furthered his argument for cultural relativity in the *American Anthropologist* article "Changes in the Bodily Form of Immigrants." "Changes" was a case study of the cephalic index, which is a particular

[91] When comparing humans to monkeys it might be hard to not view humans as "more" evolved, or advanced. This is due to our stubborn insistence that humans are special in some way. A quick thought experiment illustrates this bias: pick another animal, e.g., a lion or a dolphin or an eagle, and ask if it makes sense to assert that they are more evolved than a monkey. In this example, it is clear that each animal evolved for its own particular niche in the ecosystem.

ratio of a head's length to width. As odd as that sounds, prominent intellectuals of the time used the index to classify humans into categories of ascending order. Nordic heads, for example, are on average a 75 on the cephalic index, and this particular head shape was associated with the supposedly superior physical and intellectual traits of those people. Interestingly, Boas chose not to argue that head size was irrelevant, but that head sizes changed due to their environment. To prove this, he analyzed the cephalic indices of second-generation immigrants, concluding that their heads had dramatically "improved" relative to their foreign born parents. Thus, it was a person's environmental influences that mattered most, not a genetic blueprint.

For Boas, the greatness of ancient Chinese and Egyptian civilizations provided yet more proof of the importance of historical, geographical, and cultural context when studying humans. If white people were objectively superior, how does one explain the fact that Asians and Africans had previously been the most powerful and sophisticated civilizations in the world? This line of argument brought Boas into collaboration with the African-American intellectual W.E.B Dubois, who invited him to give the commencement address at Atlanta University in 1905. For Boas, who inherited a monogenesis perspective from his mentor, Theodor Waitz, all human beings were brothers and sisters sharing the same original common stock, and their perceived irreconcilable differences were simply adaptations to their particular environments.[92] To those committed to the view that indigenous peoples were somehow beneath or less

[92] The debate between monogenesis and polygenesis was not simply academic; each view carried with it a perspective on human diversity and the proper relationship between the races. Proponents of scientific racism often believed in polygenesis, which supported white supremacy by claiming that white and black people were not of the same stock and thus not privy to the same rights and privileges.

human than whites, he replied, "the mind of the native enjoys as well the beauties of nature as we do; he expresses his grief in mournful songs, and appreciates humorous conceptions… it is only the superficial observer to whom he appears stupid and unfeeling."[93]

By 1917, Boas had transformed his discipline, causing Robert Lowie, a curator at the American Museum of Natural History, to declare a new age of anthropology, one based on the dictum "Omnis cultura ex cultura."[94] Sociology was next. Inspired by Comte's concept of unified knowledge, the first prominent American sociologist, Lester Ward, accepted the premise that evolutionary theory played a key role in the analysis of society. His influence convinced the first generation of sociologists in the United States to make similar assumptions, as seen in G. Archibald Reid's 1906 article, "The Biological Foundations of Sociology," which he wrote for the discipline's first scholarly journal, the *American Journal of Sociology*.[95] The interdisciplinary trend continued for the fledgling discipline (only the University of Chicago and Columbia offered graduate degrees in the subject as late as 1920) throughout its early years, as it embraced the theories and methodologies of psychology, which at the time was dominated by William James and G. Stanley Hall. The incorporation of James' and Hall's theories on instinct and recapitulation, respectively, which were quite influential at the time, gave sociology a

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[93] Franz Boas, "Poetry and Music of Some North American Tribes," *Science* 9 (April, 1887).

[94] Basically, "all culture comes from culture." Lowie intended this to be a maxim for anthropological methods: "This means that (an anthropologist) will account for a given cultural fact by demonstrating some other cultural fact."

[95] G. Archdall Reid, "The Biological Foundations of Sociology," *American Journal of Sociology* 11, no. 4 (1906).

surge in popularity—but left the discipline without an independent identity and even further associated with the ugliness of scientific racism due to Hall's conspicuous role in the construction of race hierarchies.[96] Increasingly, the leaders of the field began to recognize the need to eliminate outside influences.

Boas' attacks on biological determinism in human affairs found fertile ground in the hearts and minds of the sociologists. Many of these men were liberal thinkers who saw sociology as both an academic discipline and a tool for facilitating democratic ideals, and they welcomed the opportunity to marry their professional and political values. The future president of the American Sociological Society, Ellsworth Faris, for example, celebrated that Boas had discredited the false, invidious "distinctions between the civilized and the savage mind."[97] By the 1920s, sociologists had turned the corner and begun the hard work of laying a new foundation for the discipline, one based on the premise that culture, not biology, was the place to look for insights into human behavior: "Sociology is at last shaking itself free from biological dominance and is developing an objective and a method of its own. Thus it promises to be a science, not merely a poorly organized and presumptuous branch of biology, as some biologists formerly seemed to regard it."[98]

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[96] Recapitulation is the now discredited theory that as an embryo matures it transitions through the actual stages of evolution. Hall argued that human beings undergo a similar process as they develop from babies to adults. In other words, the reason that children are wild and irrational is that they are, literally, a primitive form of human at the time. According to Hall, white children have the potential to develop further but black children do not, as that is the limit of their race's evolution.

[97] Carl Degler, *In Search of Human Nature,* 102.

[98] Sociologist Luther Bernard, as quoted in Hamilton Cravens, *The Triumph of Evolution: The Heredity-Environment Controversy, 1900-1941* (Baltimore: Johns

Even those who continued to believe that biology could inform the social sciences found themselves standing on increasingly tenuous ground, as physical scientists in different fields began to doubt natural selection was the mechanism driving evolution. This posed a serious problem for advocates of biologically informed policies such as eugenics because the attempt to manage the evolution of society by selecting who should and should not have children would be completely misguided, not to mention cruel, if evolution did not take place through selection in nature. The mounting skepticism stemmed from the inability of the theory of natural selection to adequately solve several nagging problems. For example, the gradual, cumulative nature of the process did not seem capable of causing radical change. Perhaps selection could account for a species getting incrementally better, say taller or faster, but how could it be responsible for the development of wings or eyes? Another problem involved time, or, more specifically, the lack of it. The prevailing estimate of the earth's age was between ten and a hundred million years old (which is around four billion years off current predictions), and a process as slow as natural selection could not possibly have generated the vast variety of life on earth in that time period. It simply took too much time.

There was also the question of "blending," the common-sense criticism that natural selection of favorable abnormal traits would not modify a species because reproduction inexorably returns outliers to the mean. Take an abnormally tall person as an example. One could imagine relative height to be advantageous in certain

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Hopkins University Press, 1988), 121.

environments and reasonably speculate that this individual would have more children due to her comparative advantage. But what about the mate? The mate would almost certainly be shorter if in fact great heights were abnormal, and thus the children would most likely be only slightly taller than their peers. When these slightly taller children matured and reproduced with average partners of their own, their grandparent's initial advantage would be even further diminished, and so on through the generations.

The lack of answers to problems such as these resulted in the rise of new explanations for evolution. Some of these explanations clung too tightly to outdated ideology and would fade from relevance. Others would inform scientific inquiry well into the twentieth-century. But they all undermined the credibility of natural selection. By 1907, the reputation of Darwin's central insight had fallen far enough for the biologist Vernon Kellogg to argue, "(T)he fair truth is that the Darwinian selection theory, considered with regard to its claimed capacity to be an independently sufficient mechanical explanation of descent, stands today seriously discredited in the biological world."[99] Kellogg's despairing words (he was a proponent of natural selection) might have been hyperbolic, but it does reflect the troubled history of one of today's most respected and widely accepted theories. As late as 1940, Julian Huxley, a British scientist, could reasonably label the collective efforts of natural selection's detractors as the "eclipse of Darwinism."[100]

One of the most serious challengers to natural selection was Lamarckism, which

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[99] Vernon Kellogg, *Darwinism To-Day* (New York: H. Holt & Co., 1907), 3.

[100] Julian Huxley, *Evolution: The Modern Synthesis* (London: Allen and Unwin, 1942), 22.

had been labeled "Neo-Lamarckism" to make it more palatable than the earlier, discredited theory, but with only minor modifications to the basic premise. Although August Weismann's experiments on rats' tails had repudiated the inheritance of acquired characteristics for the majority of scientists, the Neo-Lamarckians held on to the promise of perfectibility through evolution. Ernst Haeckel, a leader of this perspective, claimed that offspring only inherited characteristics that were willfully cultivated, like strength or intelligence, not arbitrary body modifications such as chopped off tails or foreskins. Primarily field naturalists and paleontologists, the Neo-Lamarckians contended that their work in the field revealed progressive phenotypic development among animals, not random change. Over time, bears had gotten stronger, fish had gotten faster; evolution seemed to correspond with the use of characteristics beneficial to each particular species. The Neo-Lamarckians believed Weismann's flawed experiment had caused the scientific community to prematurely accept natural selection, which had significant theoretical limitations.[101] To prove their point, they began to conduct experiments of their own.

Paul Kammerer, an Austrian biologist, conducted the most prominent of these experiments. He claimed that midwife toads could willfully adapt to changing environments. To demonstrate this fact, Kammerer increased the temperature in the toads' cages, forcing them to spend their time in the cool water rather than land, which is where they typically reside. In response, "the males, probably on account of the difficulty of clasping the female in the water, have developed as an adaptation coarse swellings on

[101] A Neo-Lamarckian critique of natural selection can be found in G.C. Robson, *The Species Problem: An Introduction to the Study of Evolutionary Divergence in Natural Populations* (Edinburgh: Oliver & Boyd, 1928), 158-172.

their thumbs."[102] According to Kammerer, the midwife toad experiments proved Lamarckism, and, in turn, provided human beings with scientifically based optimism for the future:

> This wonderful new result, together will all those previously attained, opens an entirely new path for the improvement of our race, the purifying and strengthening of all humanity…If acquired characters, impressions of the individual life, can, as a general thing, be inherited, the works and words of men undoubtedly belong to them. Thus viewed, each act, even each word, has an evolutionary bearing…The active striving for definite, favorable, new qualities will in a like manner yield the power to transmit the capabilities which we have acquired, the activities which we have busily practiced, the overcoming of trials and illness—will leave somewhere their impress upon our children.[103]

Unfortunately for Kammerer and those who associated social progress with Lamarckism, his experiment soon fell under intense scrutiny and charges of fraud. In 1926, G.K. Noble of the American Museum of Natural History used microscopic analysis to prove that the "coarse swellings" on Kammerer's midwife toads were due to injections of India ink, not a natural biological development. Despite Kammerer's protestations of innocence (he claimed an assistant must have injected the frogs without his knowledge), the scientific community largely took him to be a fraud and he took his own life on September 23, 1926, just a few weeks after the allegations surfaced.

Around the same time, John William Heslop-Harrison claimed his experiments on peppered moths proved that they could change their coloration when exposed to pollution. However, his findings also fell under disrepute when other scientists were

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[102] Bowler, *The Eclipse of Darwinism*, 93.

[103] Alfred Kammerer, "Adaptation and Inheritance in the Light of Modern Experimental Investigation." Annual Report of the Board of Regents of The Smithsonian Institution: Showing the Operations, Expenditures, and Conditions of the Institution (Washington: U. S Government Printing Office, 1913), 439.

unable to replicate the same result. How do we explain these desperate, scandalous efforts to advocate the inheritance of acquired characteristics? Of course, crass desire for individual recognition could have played a significant role. Less cynically, perhaps these men felt that Neo-Lamarckism was the only hope for a progressive future. Kammerer clearly believed his experiments on toads had direct implications for human beings and modern society. And there were certainly people outside scientific circles who felt that way. At the height of Kammerer's popularity, newspapers across the country joyfully speculated on the potential to create "supermen" through willful evolution.[104] In the preface to *Back to Methuselah*, George Bernard Shaw passionately declared, "if one could not disprove selection, one must still, from the depths of one's conviction, tell its supporters that they are fools and liars."[105] Apparently, the need for evolution to support the prospect of human perfectibility trumped any commitment to scientific integrity for Neo-Lamarckians, which meant this theory would remain influential, even if shrouded in scandal, until it could be definitively rebuked.

Ideological concerns guided another one of natural selection's major competitors, orthogenesis, which is the theory that evolution intrinsically develops in a linear fashion.[106] Orthogeneticists, however, were committed to scientific rather than social values. These men did not necessarily believe evolution validated social progress, like the

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[104] Arthur Koestler, *The Case of the Midwife Toad* (New York: Random House, 1972), 90.

[105] Bowler, *The Eclipse of Darwinism*, 105.

[106] The German biologist William Haacke first coined the term orthogenesis in 1893. Dissecting the word into its Latin roots, "ortho" and "genesis," it literally means "straight origins."

neo-Lamarckians did, nor did they believe that it led to some "higher" or "better" result, as that would be too teleological to be compatible with contemporary scientific views.[107] Instead, they remained committed to the notion that nature obeyed fixed, universal laws. An evolutionary theory firmly rooted in the scientific tradition established after the Scientific Revolution—and before the Second Scientific Revolution that revealed the extent to which chance and unpredictability govern reality—orthogenesis appealed to those who found solace in an understandable world, one where, as Einstein once said, "God doesn't play dice."[108]

From the orthogenicists' point of view, natural selection was not simply a flawed scientific theory, it was not even qualified to be considered science. Science, when properly done, revealed universal laws, made accurate predictions, and could be proven wrong in experiments.[109] Natural selection failed to meet all of these criteria because it depicted evolution as essentially random (Darwin himself faced similar criticism from the influential philosopher of science Sir John Herschel who contemptuously labeled Darwin's theory the "law of higgledy-piggedly" for relying on chance and thus being

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[107] Some orthogeneticists, especially the early ones, did believe evolution was goal-oriented. For example, Carl Nageli spoke of an "inner perfecting principle." In *The Structure of Evolutionary Theory*, however, Stephen Jay Gould convincingly demonstrated that "most leading orthogeneticists held strictly mechanistic views."

[108] This quote from Einstein is perhaps apocryphal.

[109] Orthogeneticists also claimed that Mendelian genetics, which was another alternative to natural selection, was "a mere manifestation of mongrelism" incapable of explaining the origin of species or the orderly progression found in fossil records because it argued that random mutations drove evolution. John Walter Gregory and W.D. Lang, *Catalogue of the Fossil Bryozoa*, in the Department of Geology, British Museum (London: Printed by Order of the Trustees, 1899), vii.

incapable of prediction.).[110] Further, the orthogeneticists bemoaned Darwin's reliance on adaptation—a phenomenon for which there can be no incontrovertible evidence. They believed it was too easy to claim the adaptivity of a particular phenotypic characteristic and too hard to disprove. How, for example, does one show that the hair on human legs is *not* an adaptation to keep us warm? It sounds plausible, but plausibility cannot stand as the bedrock of science. Clever scientists could come up with adaptationist explanations for just about every trait, which would bring us no closer to the truth.

To make their case, orthogeneticists sought examples of orderly, nonadaptive evolution.[111] Horses featured prominently in these early efforts because their fossil record showed what appeared to be regular and goal-oriented evolution.[112] In the eyes of orthogeneticists, the horses' phylogenetic tree was not random and branching, which is how most observers would see it today, but a clear progression toward the prototypical horse of today.[113] It is as if the orthogeneticists believed there was a Platonic ideal for each species and that evolution was an effort to realize that ideal. The apparent evolution

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[110] Dejected, Darwin considered this critique from a man he greatly admired to be "a great blow and discouragement." Charles Darwin, *The Life and Letters of Charles Darwin*, Vol. 2 (London: John Murray, 1888), 240.

[111] An influential example was the provocatively titled, *On Orthogenesis: And the Impotence of Natural Selection in Species Formation*, by Theodor Eimer, which argued that butterfly coloration had no adaptive significance.

[112] According to the paleontologist George Simpson, "the most widely cited example of orthogenesis, in any sense of the word, is the evolution of the horse." George Gaylord Simpson, *Tempo and Mode in Evolution* (New York: Columbia University Press, 1944), 157.

[113] Similarly, orthogeneticists, many of whom were paleontologists, looked to the fossil record of an extinct marine mollusk called an Ammonite to argue orderly evolution. Specifically, over millennia these animals grew larger and added compartments to their shells.

"toward" the modern horse, therefore, supported the orthogenetic view that "In all cases the individual and its series must change by growth along certain lines of modification."[114] From the orthogenetic perspective, the "growth" of a species, its evolution, was not a random process driven by natural selection but an orderly march toward a predetermined goal. Further, evolution was not necessarily adaptive, as natural selection claimed, but could lead a species to decline or even extinction.

Orthogeneticists argued that the extinction of a species conclusively discredited Darwinian natural selection and adaptation. As paleontologists, they largely relied on the fossil record as evidence for their claims, and the fossil record showed that a number of species did not adapt to their environment over time. They went extinct. The Irish elk, for example, appeared to develop along a species-specific path that brought about a period of fecundity followed by a period of reduced fitness. At first, orthogeneticists speculated, the Irish elk's increasing antler size must have brought considerable advantages, but over countless generations the antlers continued to grow until they eventually became such a burden that the species could no longer successfully compete with its rival ungulates.[115] Russian biologist and staunch Darwin critic Lev S. Berg explained the orthogenetic implications of these findings: "The fact that not infrequently evolution proceeds, as it were, in face of the environment, in a direction leading the organism to destruction" implies that "there are intrinsic and constitutional agencies laid down in the chemical structure of the protoplasm, which compelled the organism to vary in a determined

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[114] Hyatt, Alpheus. "Transformation Of Planorbis: A Practical Illustration Of The Evolution Of Species." *Science* 1, No. 12 (1880): 18.

[115] The Irish elk were not the only example of growth and decline. Saber tooth tigers had a similar story regarding their eponymous teeth.

direction."[116] In other words, evolution was orderly, and it was nonadaptive.

Orthogeneticists' commitment to "determined" evolution did have one alarming drawback. If correct, the theory doomed the human race to an inevitable, catastrophic end, for, just as the Saber tooth tiger, Irish elk, and countless other that have become extinct before us, human evolution will eventually become maladaptive and lead to our demise. In a literal sense, the orthogeneticists believed, the lifespan of a species was analogous to that of an individual organism and the end is inevitably death. Alpheus Hyatt articulated upon the lifespan metaphor in *On the Parallelism between the Different Stages of Life*: "The proportions between the different periods of life of any one individual may be compared with accuracy to the life of the group to which it belongs; in youth to what it is in the beginning, in the adult to what it is now, and in old age to what it is to be in the future."[117] Another concerned thinker, British paleontologist F.A. Bather, also bemoaned the sad realization that "decadent races, whether ostriches or human beings…await alike the inevitable hour." Clearly, those who wanted science to align with social values, like the neo-Lamarckians, would be aghast at orthogenesis, for "it follows (from orthogenesis) that the idea of human progress as a biological law ceases to be tenable."[118] Yet, for the orthogeneticists, a more important battle had been won. They had grounded their evolutionary theory in observable evidence (the fossil record) and they

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[116] Leo Berg, *Nomogenesis: Or Evolution Determined by Law*, trans. J.N. Rostovtsov (Cambridge: MIT Press, 1969), 114.

[117] A.S. Packard, Jr. and F.W. Putnam, eds., *The American Naturalist* (Salem: F.W. Putnam & Co., 1873), 108.

[118] Francis Bather, "Fossils and Life" in the *Report of the British Association for the Advancement of Science* (London: Natural History Museum Library, 1920), 86.

had demonstrated that biology behaved rationally, like physics, and indeed that each species rose and fell as predictably as an object in orbit.

The naturalists and the paleontologists weren't the only ones with an alternative theory of evolution. Influenced by their working environment, geneticists proposed the theory of mutation, or "saltationism," as a replacement for natural selection. The geneticists eschewed the anecdotalism of fieldwork, preferring instead to conduct their work in a laboratory. There, they believed, they were able to conduct more "professional" science. Not surprisingly, the sterile, artificial confines of the lab led them to de-emphasize the importance of the natural environment, which played no role in their reach, and to focus instead on the factors existent in their experiments. What they found in their test tubes and under their microscopes was the radical transformation of a species, and even the creation of new ones, resulting from genetic mutations.

The founder of Mutation Theory was the Dutch botanist Hugo DeVries. Working without any knowledge of Gregor Mendel, DeVries postulated that individual characteristics were heritable after conducting a number of experiments on the common evening primrose, "Oenothera lamarckiana."[119] In these experiments he discerned the existence of dominant and recessive traits, and how they interacted to produce variety through generations.[120] The wild, dramatic changes the primrose made in the course of a

[119] He called the mechanism for this "pangenes," which Wilhelm Johannsen would later shorten to "genes."

[120] There is some controversy as to whether or not DeVries was aware of Mendel's work. DeVries claimed he was not, and late in his life believed that he, rather than Mendel, should be considered the "father" of genetics. Carl Correns, however, criticized DeVries for not referring to Mendel in his publication on genetics—and Devries subsequently added the reference.

single reproduction caused DeVries to claim that mutations played a significant role in natural selection.[121] According to DeVries, evolution did not take place gradually, it burst forth in rapid episodes of dramatic change. Dwarfs, giants, and albinos seemingly proved this point. And the sudden creation of evening primroses simply couldn't be explained any other way.[122]

A major advantage to mutation theory was that it solved two of the major weaknesses of natural selection. If evolution took place rapidly, as it did according to DeVries, there was no longer any incompatibility between evolution and the relatively young earth (Remember, scientists at this time had miscalculated the age of the earth by billions of years). Also, the "incomplete" fossil record was now complete. There weren't "gaps" in the record; evolution proceeded in fits and starts, which is exactly what the paleontologists were seeing. Convinced of his theory's superiority, DeVries lectured widely on its advantages, eventually compiling his arguments in a provocatively titled treatise, *Species and Varieties: Their Origin by Mutation*.[123]

All of these competing theories of evolution eroded confidence in Darwinian natural selection, which brought into question the application of "survival of the fittest" logic in public policy. Advocates of a laissez faire government that accepted social inequality as natural were worried, and rightly so. If, for example, the Neo-Lamarckians

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[121] DeVries did see a role for natural selection, but on smaller traits and more to prevent maladaptive traits from developing rather than generating positive, novel ones.

[122] DeVries was not aware that the evening primrose is a very unusual hybrid species with atypical phenotype mutations.

[123] Hugo DeVries, *Species and Varieties: Their Origin by Mutation*, edited by D.T. MacDougal (Chicago: The Open Court Publishing Company, 1905).

were right, and an individual could pass along her acquired traits, would it not make more sense for the government to provide education and healthcare for everyone? Certainly that was better than letting people languish in poverty who had the potential for positive growth. Or, what if the mutationists were right and evolution actually took place in radical spurts? Did this not justify revolution as a means to progress? Perhaps the communist agitators in the street were right and the people should revolt for a better life. Clearly, the uncertainty about how evolution actually took place raised troubling political questions.

At the time no theory of evolution was able to definitively establish its superiority, so these questions remained unanswered; however, scientific support for Social Darwinism and eugenics, both of which relied upon natural selection, almost disappeared amidst the confusion. The genetic research led by Devries and his successors, in particular, had a devastating effect on the prevailing acceptance of these views, for the more scientists looked into the inner-workings of genes, the more they realized that physical characteristics were vastly more complex than an expression of a single gene. Humbled, geneticists had come to realize that they barely understood how genes even functioned, which rendered absurd the idea that they could offer reasonable suggestions for how to manage the genetic stock of a diverse human population.

The prime protagonist in this next generation of genetics research was Thomas Hunt Morgan. Having grown up in the American south, Morgan took up science as an adult to combat the religious beliefs that had suffocated him in his youth. Initially, he favored a blend of orthogenesis and mutation theory as the most plausible explanations for evolution, as natural selection smacked of religious mysticism to the young Morgan

because it explained too much, too simply, and seemed to engender the kind of blind faith among its adherents that he deplored.[124] After establishing his famous "fly rooms" at Columbia University in 1910, however, Morgan changed his views.[125] Working with the fruit fly "Drosophila," he learned that mutations occurred in single genes and produced minor changes to the species and that the changes were random, not the by-product of an inner-directed course of evolution.[126] These insights convinced him to disregard orthogenesis. He had found that the relationship between genes and phenotypes was the critical factor in evolution—and far more complex than previously understood.

In 1916, Morgan's laboratory discovered that at least seven different factors determined a drosophila's eye color, effectively ending earlier hopes that phenotypic characteristics correlated to a single gene.[127] In addition, genes appeared to be linked at times and interdependent at others. And in many cases there would be a "crossing over" of genes from one chromosome to the other. As if that was not enough, Morgan and his researchers began to look at the affect of environment on trait development and

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[124] Scientifically, he challenged Darwinists' attachment to adaptation. Morgan believed that mutations, both good and bad, would remain because adaptation to the environment was not that important. Thus, in his experiments he sought to show that useless characteristics are just as common as useful, "adaptive" ones.

[125] Morgan's fly room was a radical scientific laboratory for its time. Unlike most labs, which featured a lead scientist and subordinates, Morgan's fly room embraced democratic scientific inquiry where everybody worked together as partners. This unique environment proved to be extremely successful, as five of Morgan's students went on to win the Nobel Prize.

[126] He chose this species because it was inexpensive to culture in laboratory conditions, it had a short life cycle, it produced large numbers of externally laid embryos, and they could be genetically modified in numerous ways.

[127] Calvin B. Bridges, "Non-Disjunction as Proof of the Chromosome Theory of Heredity," *Genetics* 1 (1916): 1-52; 107-63.

determined that the expression of a gene was intimately tied to its surroundings. Truly, genetics had undergone a significant transformation, as Morgan's genes opened up a world of questions that Mendel's genetics had not even thought to ask. Morgan's textbook *The Mechanism of Mendelian Heredity* showed a new generation of geneticists the future of the field: exploring the incredible complexity of genes, not a naïve attempt to discover and manage the genes responsible for traits.[128]

The professionalization of genetics had created an insurmountable gap between leading genetic theory and eugenics. If the eyes of flies were complex, human behavior was practically unfathomable. Subsequently, professional geneticists of the time went out of their way to counter the growing tide of eugenic policies. In his chapter on human genetics in *Evolution and Genetics*, Morgan reminded the reader, "we (should not) feel any assurance in deciding genetic superiority or inferiority as applied to whole races."[129] In another early exhortation of the interdependence of nature and nature, Johns Hopkins geneticist Herbert Spencer Jennings wrote, "Neither the material constitution alone, nor the conditions alone, will account for any event whatever, for it is always the combination that has to be considered."[130] Eugenics was simply an impossible task

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[128] Thomas H. Morgan, *The Mechanism of Mendelian Inheritance* (New York: H. Holt and Company, 1915). Contemporaries recognized the book's importance. Here is American biologist Edwin G. Conklin in a letter to Morgan: "I thank you…for….sending me a copy of…*The Mechanism of Mendelian Inheritance*….I think it is the most important contribution to our knowledge of heredity in recent years, perhaps even the most important advance since the work of Mendel."

[129] Thomas Hunt Morgan, *Evolution and Genetics,* 2nd ed., (Princeton: Princeton University Press, 1925), 206-207.

[130] Herbert Spencer Jennings, "Human Inheritance," *American Naturalist* 58, no. 9 (1924): 395-409.

considering the newfound complexity of genes combined with cultural factors.

The implausibility of eugenics, however, did not mean it could safely be ignored. The rise of the Nazi party to power in Germany made that clear. The specter of Nazism across the English Channel compelled the prominent British eugenicist, Julian Huxley, to begin arguing that "race" was a social and not biological concept.[131] There were no distinct races of "Teutonic" people or Jews, he argued, so the Nazi narrative was fundamentally flawed. To prove his point, Huxley ironically queried, "how close a composite of the black-haired Hitler, the broad-faced Rosenberg, the slight Goebbels, and the rotund Goering would come to the Teutonic ideal?"[132] In fact, scientific analysis of their characteristics revealed that Jews and Gentiles shared every trait imaginable, and there was no scientific way to discern who was who based solely on an analysis of phenotype. Subsequently, when speculating on how to improve society, "a little goodwill might seem more fitting in treating those complicated questions than the attitude adopted by some of the modern race-propagandists."[133]

In many ways, the rise of the Nazi party and their horrific effort to eliminate Jews and other "undesirables" from their country would prove to be the proverbial "final nail" in eugenics' coffin. Philosophers, anthropologists, sociologists, and scientists had effectively discredited the application of biology to human affairs among intellectuals,

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[131] This was not necessarily a repudiation of his earlier eugenic stance. While not believing in race as a biological concept, he still felt society could be improved by facilitating reproduction between remarkable people of whatever skin tone.

[132] Kevles, *In the Name of Eugenics*, 133.

[133] Thomas Hunt Morgan, *Evolution and Genetics,* 2nd ed., (Princeton University Press, 1925), 206-207. Take note of his use of the term "propagandists," which illustrates Morgan's perspective that eugenicists were not professional geneticists.

but there is a big world outside the ivory tower and it was clear there would need to be a political repudiation as well to end eugenics once and for all. American resistance to Nazi eugenics, however, was not immediately forthcoming because the two countries embraced many of the same core values and prominent thinkers on both sides of the Atlantic shared the conviction that they were on the front lines in a pitched battle against "inferior" citizens' deleterious effects on their nations. Leon White, for example, who served as the secretary for the American Eugenics Society, lauded Nazi eugenic policies: "(we) have long been working earnestly toward something very like what Hitler has now made compulsory."[134] Similarly, in the *Journal of Heredity*, an influential eugenics journal in the United States, Paul Popenoe admired Hitler's willingness to place "his hopes of biological regeneration solidly on the application of biological principles of human society."[135]

American eugenicists admired Nazi Germany's ability to quickly enact policies without the burden of democratic resistance or the appeal to constitutional rights. In the United States, eugenicists had only been able to sterilize relatively small numbers of people, primarily the incarcerated. Nazi Germany, on the other hand, passed the Eugenic Sterilization Law in 1933, and this gave the state the power to sterilize anyone disabled in some manner, despite their legal standing or protests to the contrary. Within three short years almost two-hundred and twenty-five thousand men and women had been sterilized, many of whom suffered from nonheritable diseases like blindness, physical deformity,

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[134] Jonathan Spiro, *Defending the Master Race: Conservation, Eugenics, and the Legacy of Madison Grant* (Lebanon: University of Vermont Press, 2009), 364.

[135] Stefan Kuhl, *The Nazi Connection: Eugenics, American Racism, and German National Socialism* (Oxford: Oxford University Press, 2002), 364.

epilepsy, and alcoholism. To carry out this plan, the government required all doctors to report "unfit" people to the newly formed Heredity Health Courts, and issued stiff penalties for those who did not comply. Besides efficiency, American eugenicists applauded Nazi Germany's early emphasis on "positive" eugenics, which meant that they facilitated breeding among the "biologically sound." Lebensborn, translated literally as the "fount of life," was one prominent example of Nazism's positive eugenics. These were spa-like homes where S.S. mothers went to receive the best health care. Because these women did not need to be married to be admitted, many powerful Nazi leaders sent their mistresses there. For the "desirable" women who were married, the government offered loans that would be forgiven upon the birth of a baby.

The Nazis also found much to like across the ocean. German leadership, including Adolf Hitler himself, looked to the United States for historical guidance in how to solve the "race problem."[136] As terrible as it sounds, the United States government-sanctioned genocide of Native Americans actually inspired him because it effectively opened the country for white settlement in much they same way Hitler hoped to open an Aryan homeland, or Lebensraum, in Europe. Further, America's racist subordination of black people from slavery through Jim Crow modeled how a society founded on the principle of white supremacy could marginalize designated groups of others. In fact, Hitler considered Madison Grant's *Passing of the Great Race* to be his "bible," and wrote the author a flattering letter from prison. Here is Hitler explicitly praising American efforts to manage its national stock, "There is today one state in which at least weak beginnings

[136] Initially Nazi eugenics was not explicitly anti-Semitic. Hitler's increasingly psychotic fixation on Jews, however, inevitably influenced the nation's eugenic policies, and, before long, the effort to establish a pure "Aryan" Germany transformed eugenics into euthanasia.

toward a better conception are noticeable. Of course, it is not our model German Republic, but the American Union, in which an effort is made to consult reason at least partially. By refusing immigration on principle to elements in poor health, but simply excluding certain races from naturalization, it professes in slow beginnings a view which is peculiar to the folkish state concept."[137]

The mutual respect among German and American eugenicists began to fracture, however, as Hitler continued to annex territory through military force. Americans increasingly viewed Germany less as a kindred progressive nation and more as a threat to Western values. To their horror, American eugenicists, who prided themselves on their commitment to objective science, witnessed Germany's management of their nation's genetic stock degrade into an ugly tool of political oppression. German intellectuals, some of the brightest men and women in the world, fled in droves, fearing that they, too, would be persecuted under the Nazi regime. Clearly, something had gone wrong, and it became incumbent to re-evaluate the relationship with Germany and the central tenets of eugenics.

In 1933, Robert M. Hutchins at the University of Chicago formed the Emergency Committee in Aid of German Displaced Scholars. Within the year, multiple other universities followed suit. The rejection of Nazi terror cast eugenics in a new pejorative light. Herman J. Muller, an American geneticist and future Nobel laureate, wrote that eugenics had become "hopelessly perverted" into a scientific justification for "advocates of race and class prejudice, defenders of vested interests of church and state, Fascists,

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[137] Adolph Hitler, *Mein Kampf* (London: Hurst and Blackett, 1981), 439.

Hitlerites, and reactionaries generally."[138] When the Third International Congress of Eugenics was held in New York City, only a few hundred people attended.[139]

Despite the changing tide of public opinion, the remaining advocates of eugenics were not simply quacks and racists. Many of them were eminent scholars. As such, they recognized that eugenics as previously conceived was over, but they held hope for new, more sophisticated efforts. Luminaries such as R.A Fisher, Karl Pearson, George Bernard Shaw, Julian Huxley, and Havelock Ellis led the new effort of "reform eugenics," which distinguished itself from earlier iterations by avoiding grand claims about the superiority of a certain race or class to instead focus on individuals. Presumably, this would be more democratic and less amenable to tyrannical government applications. Further, they operated within the new, Morganian paradigm of genetics that emphasized the role of environment in phenotype expression, leading them to support social welfare and other efforts to facilitate the positive expression of one's potential. Like their predecessors, these men believed it was possible to discern superior and inferior human beings; however, they believed that in order to do so it was necessary to first create a level playing field. In a 1936 lecture to the British Eugenics Society, Huxley succinctly articulated the reformist credo: "We can't do much practical eugenics until we have more or less equalized the environmental opportunities of all class and types—and this must be by leveling up."[140]

Soon, however, even the reformist eugenicists found themselves on tenuous

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[138] Kevles, *In the Name of Eugenics*, 164.

[139] Ibid., 170.

[140] Julian Huxley, *Essays of a Biologist* (New York: A.A. Knopf, 1923), 86.

ground. After Hitler declared war on the United States in 1941, dialogue in the United States bifurcated into the simple binary of "us" and "them," and it was no longer politically expedient to support policies that could be construed as Nazism. Further, eugenics, which had started as a seemingly practical attempt to scientifically manage society, had transformed into an effort to construct a "master race." This revolting cause, marred by increasing reports of mass murder, led people to view eugenics as simply scientific justification for committing atrocities to gain political ends. Former Auschwitz inmate Marie Claude Valliant-Couturier revealed the ugly truth behind the scientific facade: "The Germans said they were looking for the best method of sterilization so they could repopulate all western European countries with Germans within one generation after the war."[141]

Hitler's suicide on April twentieth, 1945 signified more than the military defeat of the Axis Powers. Major cultural changes followed as well. Germany abandoned its ambitions for imperial glory to become one of the more peaceful and progressive nations among its European peers. Japan, stripped of its military power, would reinvent its aggressive identity to embrace cartoons and entertainment.[142] And throughout the industrialized world, nurture triumphed over nature as the lens through which to analyze human beings. Within two years after the fall of Nazi Germany, a leading scientist, geneticist Theodosius Dobzhansky, and anthropologist, M.F Ashley-Montagu, declared a new consensus on the subject. "Instead of having his responses genetically fixed as in

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[141] Degler, *In Search of Human Nature*, 169.

[142] John Ralston Saul, *Voltaire's Bastards: The Dictatorship of Reason in the West* (Toronto: Penguin, 1993).

other animal species, man is a species that invents its own responses, and it is out of this unique ability to invent…his responses that cultures are born."[143] No longer did one need to understand genes and genomes to be able to understand human beings. Yes, humans had evolved, but the salient aspect of our evolution was our flexibility. In the same article, Dobzhansky and Ashley-Montague explain, "The effect of natural selection in man has probably been to render genotypic differences in personality traits, as between individuals and particularly as between races, relatively unimportant compared to their phenotype plasticity."[144]

By the early 1950s, evolutionary analysis had no place in the social sciences, as academics across the disciplines collectively rejected notions of biological influence in human affairs and embraced cultural analysis as the future of intellectual inquiry. From a modern perspective, the repudiation of biological thinking might seem an unnecessary limitation, but for those personally involved in the endeavor (all of whom vividly remembered the atrocities committed by Nazis in the name of evolutionary progress), the decision was necessary. Further, the emphasis on culture was not solely a limitation; it was as much about exploring new ideas as it was about shutting the door on the racist, sexist perspectives of the past.

After decades of academic wrangling, cultural analyses had firmly replaced biological interpretations among intellectuals on both sides of the Atlantic and, in the process, a new vision of liberalism emerged. At the turn of the century liberals had

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[143] Theodosius Dobzhansky and M.F Ashley Montagu, "Natural Selection and the Mental Capacities of the Mind," *Science*, June 6, 1947, 587.

[144] Ibid., 588.

despaired when Weismann's experiments demonstrated that acquired characteristics could not be inherited because they had assumed that human beings' intrinsic worth was found in one's genes. If the genetic stock could not be "improved" through education, it seemed like eugenics was the only viable path forward to progress. Now, due to a combination of philosophical dissent, academic rivalry, developments in genetics, and the horrors of Nazi Germany, the correlation between a person's worth and her genome had lost credibility. It was no longer necessary to improve one's genes to improve the individual; everyone is equally capable of development and it is the environment rather than aptitude that explains differences in ability. The new liberal consensus that emerged after World War II is akin to John Locke's "blank slate" in that all human beings are born on equal footing, which places the responsibility on society to create positive environments conducive to growth.

Powerful governmental organizations promptly established the new liberal orthodoxy in the wake of biological determinism's fall from grace. Reflecting the political undertones that surrounded the shift in scientific opinion, the constitution of the recently formed United Nations Educational, Scientific and Cultural Organization (UNESCO) stated, "The great and terrible war that has now ended was a war made possible by the denial of the democratic principles of the dignity, equality and mutual respect of men, and by the propagation, in their place, through ignorance and prejudice, of the doctrine of the *inequality* of men and races."[145] The assumption that men varied in ability had been with Western thinkers for centuries, but World War II placed that assumption on its head. Democratic values now reigned, so equality was assumed and it

[145] UNESCO, "The Race Question," *Unesco Publication* 791, 1950.

was inequality that had to be explained. UNESCO's statement on "The Race Question" on July eighteenth, 1950 captured the new ethos, declaring to the world that "The law sees in each person only a human being who has the right to the same consideration and to equal respect. The conscience of all mankind demands that this be true for all the peoples of the earth."[146]

The liberal platform endorsed by governmental organizations deeply influenced academia, as universities depend on public funding and logically strive to demonstrate shared values, yet the relationship went both ways. To remain at the forefront of innovation and expertise, governments turn to academic advisors, and in this instance these two pillars of society mutually reinforced each other's liberal transformation—with results that outran the original intent. Beyond simply challenging biological determinism, prominent governmental and academic organizations increasingly denied any effect of biology on human behavior whatsoever. The third iteration of UNESCO's statement on race stated as fact a radically egalitarian perspective that seemingly claims biological distinctions don't even exist: "All peoples of the world possess equal faculties for attaining the highest level in intellectual, technical, social, economic, cultural, and political development."[147] Further, "the differences between the achievements of the different peoples are entirely attributable to geographical, historical, political, economic, social, and cultural factors."[148] In other words, every human being is exactly the same.

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[146] Ibid.

[147] UNESCO, "Declaration on Race and Racial Prejudice," Adopted on November 27, 1978 by the General Conference of UNESCO at its twentieth session, held in Paris.

[148] Ibid.

The shift in focus from biology to culture in the postwar era can be seen in academic journals. For generations, psychologists had been attempting to discern which physical distinctions explained the intellectual and emotional differences between people. These efforts had led otherwise reasonable men and women to prod one another's heads during phrenological exams.[149] After that was discredited, the "father" of American psychology, William James, continued to turn to nature to explain the mind. He speculated that biological instincts were at the core of one's thoughts and behaviors. James's successor, G. Stanley Hall, the first president of the American Psychological Association, argued that children were immature because they were literally evolving through the phases of human development. According to this theory, Caucasian children could develop past this stage, but people of color could not, which is what explained their purportedly perpetual childishness. Between 1935 and 1940, however, the *Journal of Applied Psychology* published no articles on race, gender, or heredity.[150] The *American Sociological Review* was also silent on these subjects, which is striking because they had been a mainstay of biological sociology prior. Committing to the new, prevailing views, the *Encyclopedia of the Social Sciences* baldly stated that there is "no conclusive evidence of genetic differences between races."[151]

Ahead of the curve in the appreciation of diversity thanks to Franz Boas' lasting

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[149] Phrenology is the now discredited science of determining one's characteristics through an examination of the skull. It became incredibly popular in the nineteenth-century, only to fade with the rise of mesmerism.

[150] The new liberal ethos was not the celebration of difference put forth by Randolph Bourne in "Trans-National America," but rather a commitment to the notion that all differences were illusory.

[151] Degler, *In Search of Human Nature*, 205.

legacy, the American Anthropological Association had previously denounced biological determinism at a 1938 conference, yet other social sciences followed suit during the liberal consensus after the war. In 1961, the American Sociological Society officially declared the discipline's alignment with cultural analyses. Its president, Robert Faris, explained, "(In the past) ability was generally held to be fixed in a biological inheritance and improvable, if at all, only by a glacially slow and impractical eugenics program. We no longer heed the doctrinaire testers who pronounce specific individuals limits for potentialities in mechanical ability, language ability, artistic ability, and mathematical ability."[152] Basking in the victory over fascist ideals, academics embraced the liberal consensus that had formed. "Barriers in many fields of knowledge are falling before the new optimism which that anybody can learn anything," Faris exulted.[153]

Leading intellectuals across the social sciences and humanities left biological reasoning behind to explore the effects of culture, establishing a cross-discipline liberal consensus in post-World War II academia. Ruth Benedict led the way in anthropology. Born in New York City in 1887, Benedict lost her father at a young age. This early experience with death left a lasting impression on her, which can be seen in the somewhat macabre fascination with mortality throughout her studies. Perhaps this contemplation of death, the great universal among mankind, conditioned her to accept arguments for human beings' equal potential. Or perhaps it was the charisma of her thoughtful, compassionate professor, Franz Boas, that brought her to dispel notions of an intrinsic

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[152] Robert Faris, "The Ability Dimension in Human Society," *American Sociological Review* 26 (Dec.1961): 837-38.

[153] Ibid., 842.

biological hierarchy among human beings. In any case, Benedict, who as president of the *American Anthropological Association* earned the distinction of becoming the first woman to serve as president of a major American academic organization, fearlessly attacked any vestiges of biological thinking that remained in her discipline. According to Benedict, the modern world brought together previously unfamiliar peoples, and it was imperative to move past the "nationalism and racial snobbery" that had characterized the early encounters.[154] Anthropologists under her considerable influence accepted as fact that, when studying a person from another culture, "not one item of his tribal social organization, of his language, of his local religion, is carried in his germ cell."[155]

For anthropologists, culture was not an expression of a people's inherent characteristics but rather as a way of life that developed in response to unique environmental conditions. "Most people are shaped to the form of their culture because of the malleability of their original endowment," declared Benedict in her defining work, *Patterns of Culture*.[156] This reversal of primacy between nature and nurture, this firm declaration that indeed the cultural "egg" comes before the natural "chicken," had profound implications for the perception of individual beings. According to Benedict and others at this time, Babies are not born with any essential, intrinsic characteristics. They are blank slates, and in the new political and cultural climate any discussion about human nature was decried as biological determinism, and the first step on the slippery slope to

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[154] Ruth Benedict, *Patterns of Culture* (New York: Houghton Mifflin Harcourt Publishing Company, 2005), 10.

[155] Ibid., 25.

[156] Ibid., 254.

racism, sexism, and xenophobia. Leslie White, who would later become the president of the *American Anthropological Association*, reflected the discipline's views on cultural primacy:

> The fallacy of illusion here is, of course, that what one takes for "human nature" is not *natural* at all but cultural. The tendencies, emphases, and content that one sees in the overt behavior of human beings are often not due to innate biological determination…but to the stimulation of external cultural elements. Much of what is commonly called "human nature" is merely culture thrown against a screen of nerves, glands, sense organs, muscles, etc.[157]

The repudiation of biology had transformed how intellectuals perceived human beings. Instead of seeking to understand why human beings were so fundamentally different, social scientists sought to understand how culture created differences among fundamentally equal humans. And the new assumption at the heart of this intellectual endeavor was that an individual "has no instincts, because everything he is and has become he has learned, acquired, from his culture, from the man-made part of the environment, from other human beings."[158]

Sociologist Gunnar Myrdal joined Benedict in the postwar advocacy of nurture over nature and "blank-slate" human nature, writing several influential books on the matter, most notably his classic denunciation of racism in America, *An American Dilemma: The Negro Problem and Modern Democracy.* Born in Sweden in 1898, Myrdal experienced the terror of an expanding fascist Germany and became virulently opposed to arguments for biological inferiority, believing them to be ignorant justification for violent

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[157] Leslie White, "Individuality and Individualism: A Cultural Interpretation," *Texas Quarterly* 6 (1963): 120-121.

[158] Ashley Montagu, *Man and Aggression* (New York: Oxford University Press, 1968), 9.

repression. In 1938 the Carnegie Foundation funded Myrdal to study race relations in America, and he concluded, along with co-authors R.M.E Sterner and Arnold Rose, that black Americans' relatively poor economic and social standing resulted from systemic discrimination.[159] There was no hint of a racial hierarchy in the book, which upended white America's self-flattering narrative of themselves as the nation's rightful leader. The change in perspective had tremendous political implications. If black Americans were equally capable yet remained marginalized, white Americans could no longer portray themselves as benevolent paternalists; they were tyrants who repressed others for their own advantage. According to Myrdal, "(w)hite prejudice and discrimination keep the Negro low in standards of living, health, education, manners and morals. This, in its turn, gives support to white prejudice. White prejudice and Negro standards thus mutually 'cause' each other."[160]

Myrdal's solution to the "negro problem" in America would certainly not be eugenics, as there was nothing "wrong" with black people.[161] Instead, Myrdal advocated public education—the logical conclusion derived from the premise of universal human nature. In *American Dilemma*, he explains, "(t)he trend toward a rising educational level of the Negro population is of tremendous importance for the power relations discussed in this part of our inquiry. Education means an assimilation of White American Culture. It

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[159] One cannot miss the irony of the Carnegie Foundation funding Myrdal's research considering Carnegie himself was a staunch advocate of Social Darwinism.

[160] Gunnar Myrdal, *American Dilemma: The Negro Problem and Modern Democracy* (New York: Harper & Row Publishers, 1944), 75.

[161] Perhaps unsurprisingly, Myrdal also wanted to do a similar study on women's marginalization in the United States but could not get the funding.

decreases the dissimilarity of the Negroes from other Americans."[162] Those last lines might surprise you. But, remember, many post-World War II liberals did not value diversity *per se*. This was the old, not the "new" left. They still accepted, whether consciously or subconsciously, the notion that their way of thinking, that their way of living, was objectively superior. The primary distinction from their predecessors was the fact that they believed nonwhite people were capable of thinking and behaving the same way whereas their predecessors believed nonwhites to be physiologically incapable of making the necessary "improvement." Subsequently, instead of arguing for postmodern education, Myrdal argued that black Americans "acquire the traits held in esteem by the dominant white Americans."[163]

Public education quickly became a central pillar in the post-World War II liberal platform. Of course, it was imperative that this education was free and of equal quality, as early inequalities in educational experience would only exacerbate existing patterns of socioeconomic privilege. In practical terms, this meant that black children required access to the same schools as white children, and this is indeed what happened, albeit slowly and not without tremendous struggle. In *Brown v. Board*, the landmark Supreme Court case that integrated public schools, Chief Justice Warren and the other justices unanimously rejected *Plessy v. Ferguson*'s racist precedent and accepted contemporary social scientists' optimistic arguments for equal potential among all people regardless of race or ethnicity. The critical question of exactly how to educate the nation's children immediately engaged some of America's brightest thinkers, as the "blank slate" model of

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[162] Myrdal, *American Dilemma*, 879.

[163] Ibid., 929.

the mind upset earlier Progressive pedagogy that focused on training individuals to perform roles they were "naturally" predisposed to play in society.[164]

Harvard psychologist Burrhus Frederick "B.F." Skinner dominated post-World War II pedagogy in the United States. Born in a small town in Pennsylvania, Skinner originally wanted to be a writer. In college he became friends with Robert Frost and wrote short stories. His efforts, however, failed and the sensitive young man went through what he called his "dark years." It was at this time he became familiar with the work of John B. Watson, an early twentieth-century psychologist who pioneered "behaviorism," which is the belief that one's behavior is the result of conditioning rather than an expression of one's personality (Indeed, from the perspective of behaviorism, there is no such thing a person's intrinsic personality). Like his contemporaries, Watson was interested in professionalizing his discipline, making it a "real" science. In genetics, Thomas Morgan had led his colleagues away from field study and into the sterile, predictable confines of the laboratory. Likewise, Watson focused on what could be measured, behavior, and not what must remain speculative, the inner world of somebody's consciousness. For Watson, psychology should be "a purely objective experimental branch of natural science. Its theoretical goal is the prediction and control of behavior." To that end, he experimented on monkeys for years, testing his ability to predict their response to a given set of circumstances, before eventually focusing on infants in the late 1920s.

As a pre-World War II intellectual, Watson was not party to the absolute rejection

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[164] Randolph Bourne is yet again a prescient predecessor, as he rejected Progressivism in *The Twilight of the Idols* based on the argument that it trained people to excel under given circumstances rather than giving them the tools to create a better world.

of biological influence on humans. In fact, like many of his peers, he assumed evolution played a large role in our individual lives and, by extension, to society as a whole. "The behaviorist…recognizes no dividing line between man and brute," he exclaimed in "Psychology as the Behaviorist Views It."[165] So, how could a Watson, a man entirely at home in the intellectual world of his evolutionary-minded peers, inspire Skinner to establish a liberal pedagogy founded on the assumption of man's distinction from the animal kingdom? Well, by refusing to investigate consciousness and focusing instead on behavior, he essentially created the chasm between biology and culture that post-World War II academics sought. For them, there was no intrinsic human, and, for Watson, human nature existed but was too complex to be studied scientifically. Theoretically, therefore, a significant divide existed between the two camps, but, practically speaking, Watson's work was the perfect precursor. A letter he wrote to his close friend Robert Yerkes, who was largely responsible for the rise of intelligence testing in the United States, makes the intellectual precedent clear, "To my mind, it is not up to the behavior man to say anything about consciousness."[166]

After reading Watson's work during his "dark years," Skinner became invigorated by behaviorism's potential applications to education. After earning a doctorate in psychology at Harvard, he would write prolifically on the subject for the next sixty years, publishing twenty-one books and one hundred and eighty articles. In addition, he used the mechanical aptitude he had developed on his childhood farm to build inventions based on

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[165] John B. Watson, "Psychology as the Behaviorist Views It," *Psychological Review* 20 (1913): 158.

[166] John B. Watson to Robert M. Yerkes, October 2nd, 1907. Robert M Yerkes Papers, Sterling Memorial Library, New Haven, CT.

his pedagogical principles. These included an air crib, a teaching machine, and, my personal favorite, a pigeon-guided missile, which placed pigeons in the missile's transparent cone and trained them to steer the missile by pecking where they saw the intended target. Unfortunately for Skinner and those with a fondness for the absurd, the military decided to pass on this particular suggestion because, Skinner lamented, "no one would take us seriously."[167] He called his perspective "radical behaviorism" and he believed it represented a radical departure from existing pedagogy: "For twenty five hundred years people have been preoccupied with feelings and mental life, but only recently has any interest been shown in a more precise analysis of the role of the environment. Ignorance of that role led in the first place to mental fictions."[168]

The primary influence Skinner had on education was to create the belief that students needed to engage in behavior in order to learn rather then passively receive information. Only by engaging in learning tasks could students receive the feedback they needed to make better decisions in the future. He based this model of education on his "principle of reinforcement," which postulated that free will as commonly understood did not exist, and that all human actions are conditioned by the consequences of previous actions. To induce desirable behavior, both negative and positive feedback were effective, yet he preferred positive consequences when dealing with children, as punishment was prone to lead to other, unwanted consequences. The culmination of his academic work was *Verbal Behavior*, which tied together behaviorism with linguistics, yet he is probably best remembered for *Walden Two*, a utopian novel that demonstrates

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[167] "Skinner's Utopia: Panacea, or Path to Hell," *Time.* September, 1971.

[168] B.F Skinner, *About Behaviorism* (New York: Random House Inc., 1974), 20.

the benefits of a society guided by behavior management.[169]

The psychologist Skinner had joined his colleagues in sociology and anthropology to establish a post-World War II liberal orthodoxy that fiercely resisted any mention of biology when discussing human beings. Cultural analysis had become the only acceptable form of analysis for a generation of scholars. These men and women did not establish an academic orthodoxy out of thin air, however. Biological considerations had been under scrutiny for quite some time before then. Philosophers, hearkening back to the great David Hume, challenged the notion that one could logically infer anything about humans by looking to nature. Led by Henry Sidgwick and G.E. Moore, they argued that evolutionary-derived theories suffered from the "ought/is" the "naturalistic" fallacy. The rise of the social sciences as independent disciplines also fractured the foundation of biological thinking. As fledgling disciplines, they strove to assert their autonomy from the natural sciences by demarcating clear boundaries between cultural and biological academic issues. (It is for this reason the father of modern sociology, Emile Durkheim, put forth his dictum that social facts must be explained by social theories.)

Developments in genetics had likewise undermined facile applications of biology to humans such as eugenics or "scientific" racism. Thomas Hunt's experiments in the "fly room" had shown the tremendous complexity of genetic inheritance and its intimate

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[169] These fields may seem odd bedfellows but a simple experiment demonstrates their relationship in Skinner's worldview. He and his wife taught their baby to say "da-da" when it wanted more food, thus demonstrating that words are socially constructed symbols and not representatives of any pre-established person, place, or thing. Noam Chomsky severely criticized Skinner in his review of *Verbal Behavior*, as the groundbreaking linguist believed there was in fact a biological predisposition for language.

relationship with the environment. From that point forward, few professional geneticists believed it was possible to responsibly manage evolution. Finally, the horror of the holocaust, which put on graphic display the potential for terrible violence once people are categorized as “naturally” inferior or superior, provided moral justification for the liberal victors of the war to declare an end to speculation on the relationship between biology and human behavior. Cultural analysis had political and academic backing at the highest levels, and it had the moral high ground. Anyone who violated the taboo and attempted to discern biology’s influence on people would face significant consequences, both personally and professionally.

THE MODERN SYNTHESIS

By the 1950s social scientists had completely abandoned biology as a tool for their research. Unlike their turn-of-the-century predecessors, almost all of whom wrestled with the implications of evolution for human beings, postwar intellectuals focused entirely on culture as the key to unlocking the mysteries of human behavior. This is not to say that universities retreated into a "dark ages" of evolutionary denial. In fact, there was near consensus among all educated people that human beings evolved. However, the methodology of analyzing human affairs through an evolutionary lens had been discredited, seemingly for good.

From the new cultural perspective equality was assumed and inequality required an explanation. Thus, one of the great projects of the postwar social sciences was determining the cultural factors that had led to a nation's relative standing. In the context of military victory and newfound status as a global superpower, postwar American scholars initially succumbed to self-flattery and investigated what cultural factors had made the United States so great. During this era of "liberal consensus" intellectuals celebrated democracy and capitalism as the twin pillars of successful society. In time, however, the civil rights movement compelled a new generation of thinkers to examine the unfulfilled promise of democracy and capitalism for those removed from power, primarily Americans of color and women, who in fact comprised the majority of the population. Liberalism had evolved, pardon the pun, to embrace diversity and post-

modern perspectives, yet the rejection of evolutionary thinking remained constant because the new generation of scholars was unapologetically political and any perspective that could be used to justify inequality in their minds was anathema to their progressive agenda. The new liberals, who came to be known as the "New Left," had seen enough of supposedly natural discrimination.[170]

In academia, disagreement alone should not be enough to remove an idea from circulation. Heavily influenced by Hegel's dialectic concept, Western universities, in theory at least, embrace the chance to develop collective understanding through the creative tension of synthesis and antithesis. From this perspective, evolutionary thinking could have played an important role even for those who disagreed with its fundamental tenets. Simple disagreement alone did not cause Progressives in the 1960s to continue the liberal disavowal of evolutionary thinking. It was also the fact that the application of evolutionary thinking to human affairs lacked credibility. As discussed previously, a number of factors had caused intellectuals to reject the evolutionary perspective as a legitimate lens for inquiry. Philosophically, politically, scientifically, and ethically it was bankrupt, and thus academia could, with good conscience, search for answers in other directions.

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[170] These men and women were fully aware that Narratives of "natural" differences among people have facilitated exploitation throughout history. For example, the gross tyranny of feudalism depended upon the conservative influence of "The Great Chain of Being," which placed all of God's creatures in a hierarchy stretching from the rodents to the angels. Despite their obvious oppression, the devoutly Catholic serfs rejected revolution largely because they believed that to do so was an arrogant affront to God himself. Likewise, antebellum southern planters argued that black people were inherently inferior, almost like children, and that slavery was not a vicious system of oppression but rather a benign expression of paternalism. Closer to home for academics in the 1960s, the new liberals came to believe that the notion of women's supposedly natural domesticity was nothing but a modern effort to turn a man into a king and his wife into his servant.

Of course, there were outliers from the consensus, iconoclasts who insisted that the discovery of evolution had irrevocably transformed the intellectual landscape. These stubborn souls believed there was no intrinsic relationship between evolution and authoritarian politics. They saw the exclusive focus on culture as an intellectual retreat from the search for truth, one made in the context of extreme political pressures that could be reversed through dialogue. For the most part these were natural scientists, so they were protected them from the strongest winds of intellectual censorship. Also, whether deserved or not, the natural sciences benefited from a reputation of objectivity, making the authors less susceptible to personal attacks.

The evolutionary biologists Julian Huxley, Ernst Mayr, and Theodosius Dobzhansky all wrote popular works demonstrating the compatibility of anthropology with evolutionary theory. Luminaries in their respective fields, these men commanded respect from their peers but their contemporaries in the social sciences and humanities largely ignored them. The taboo was simply too strong. In 1946, when the new International Society for the Study of Evolution (SSE) began, not a single anthropologist attended.[171] Mayr actively sought anthropologists who would be willing to submit papers to the journal *Evolution,* but these otherwise publication-hungry academics declined the offer en masse. Amazingly, the journal's opening decade, which began in 1946, only received three submissions from anthropologists, much to the chagrin of its publishers. They believed social scientists were remaining willfully ignorant of the latest developments in

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[171] Vassiliki Betty Smocovitis, "Humanizing Evolution: Anthropology, the Evolutionary Synthesis, and the Prehistory of Biological Anthropology, 1927-1962," *Current Anthropology* 53, no. 5 (2012): 109.

evolution, developments that revealed the inherently contingent nature of biology, making it irreducible to inviolable laws like physics and thus unsuitable for speculations about human beings' supposedly innate characteristics.

Dobzhansky's work on the origin of species, for example, had shown that a species was in fact a diverse population whose commonality ended with the ability to reproduce together. According to him, a species was not, as had been previously assumed, a discrete and intrinsically similar entity. Diversity, not homogeneity, was the reality, meaning that categories such as race were simply "a tool for description" and not an actual biological entity.[172] The more this generation of scientists explored evolution the stronger their conviction that it was not the reductionist or determinist dogma the social scientists feared it to be. Further, they directly addressed the philosophical concerns raised by Sidgwick and Moore earlier in the century, namely that any application of evolutionary thinking to human affairs was a violation of the is/ought and naturalistic fallacies. How they did so was quite surprising: they completely agreed. "Of course," they said, you should not attempt to derive human values from observations of nature. But this does not mean you should ignore evolution, essentially sticking your head in the sand and hoping for the best. Genuine intellectuals explore truth wherever it may lead, and if there are unsavory aspects of evolution, we should aim to transcend them. Dobzhansky and Huxley, for example, believed humans were indeed inclined to act selfishly due to selection pressures, but they also believed "man could escape its own brute nature through use of mind."[173]

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[172] Ibid., 114

[173] Ibid., 113. In a sense, Huxley "inherited" this perspective, as his father,

So, how does one explain the paradox of natural scientists clamoring for social scientists to accept evolution while social scientists reject evolutionary thinking because it is scientifically discredited? The answer, in part, is the inevitable "lag" between scientific thought and the dissemination of that knowledge to laymen. Post-World War II social scientists were absolutely correct that geneticists and evolutionary biologists had discredited evolutionary thinking in the early twentieth-century. At the time, natural selection seemed incapable of answering several important questions, which had led to competing theories for the mechanisms of variation and inheritance. The only fundamental agreement among turn-of-the-century scientists regarding evolution was that there were far too many uncertainties to enable a responsible application of evolutionary theories to human affairs. Scientific inquiry, however, did not stop there. While social scientists eagerly explored cultural theories for human behavior, the natural scientists continued to search for the true mechanism behind evolution, eventually resolving the competing theories into a single, coherent framework known as the "modern synthesis."[174] Without much fanfare, scientists had overcome one of the primary obstacles to the biologically informed social science: the absence of a scientific consensus. Although intellectuals throughout the social sciences and humanities

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Thomas Huxley, who was known as "Darwin's Bulldog," argued for a similar, antagonistic relationship between morality and evolution in his classic work, *Evolution and Ethics.*

[174] The meaning and accomplishments of the modern synthesis are highly contested topics. For an in-depth analysis, see Mayr and Provine's *The Evolutionary Synthesis*, which comprises fine arguments from many of the individuals involved in establishing the synthesis.

continued to reject the application of biology to their disciplines, a new foundation had been established upon which it was possible to reintroduce evolutionary thinking to human affairs. To understand how the synthesis came to be, and to understand how the synthesis would eventually serve as the catalyst for the return of evolutionary thinking in the social sciences, requires a brief look at developments in evolutionary biology during the first half of the twentieth-century.

Remember, there were three primary alternatives to natural selection that divided the scientific community at the turn of the century: Neo-Lamarckism, orthogenesis, and mutation theory. Of these three, only mutation theory had the potential for lasting relevance, as orthogenesis and Neo-Lamarckism both suffered from attachments to outdated ideals that kept them firmly rooted in the past and unable to carry the torch of evolutionary thinking in the modern world. It is not surprising, then, that the most influential theories of evolution time embraced probability, technology, and the professionalization of intellectual inquiry. Biometrics, founded by Charles Darwin's cousin, Francis Galton, sought to modernize evolutionary biology by incorporating sophisticated mathematics and statistical methods. Raphael Weldon, a leading biometrician, declared, "The questions raised by the Darwinian hypothesis are purely statistical, and the statistical method is the only one at present obvious by which that hypothesis can be experimentally checked."[175] Galton also inspired the other leading theory of evolution in the early twentieth-century, Mendelian genetics, by theorizing that especially evolution could not occur as the result of continuous variation due to the

[175] Raphael Weldon, quoted in William Provine, *The Origins of Theoretical Population Genetics* (Chicago: University of Chicago Press, 1971), 41.

blending of inheritance and thus must occur during episodic "bursts."

Biometrics and Mendelian genetics were not fundamentally incompatible. For one, the leaders of both fields started out as friends. William Bateson, who would become the world's foremost expert in Mendelian genetics, and Raphael Weldon, the preeminent biometrician, went to school together in the late 1800s. And while not all schoolmates necessarily enjoy each other's company, Mrs. Bateson described Weldon as her husband's "most intimate friend" during his college years.[176] Further, both sides considered the same figure, Francis Galton, to be their mentor. Bateson freely expressed his admiration, "The novelty of (Galton's) thoughts and the freshness of his outlook on nature are not to be found in any other living writer, so far as I know. I often remember the thrill of pleasure with which I first read *Heredity Genius* and the earlier chapters of *Natural Inheritance*."[177] Likewise, the biometricians saw themselves as Galton's intellectual descendants. Karl Pearson, a prominent biometrician and the most mathematically gifted of the group, spent countless hours discussing evolution with Galton, considering himself the elder's protégé. Their relationship was close enough that upon Galton's death Pearson took it upon himself to write a heartfelt biography "without regard for traditional standards, to the needs of publishers or to the tastes of the reading public."[178] Despite their shared collegiate experience and mutual respect for Galton, however, the two sides bifurcated into opposing camps rather than work together to solve

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[176] Beatrice Bateson, *William Bateson, F.R.S. Naturalist* (Cambridge: Cambridge University Press, 1928), 17.

[177] Karl Pearson, *The Life, Letters, and Labours of Francis Galton,* vol. 3 (Cambridge: Cambridge University Press, 1914-1930), 288.

[178] Ibid., preface.

the problems plaguing evolutionary theory.

Biometrics emerged as a discipline to serve a specific function, "measuring the degree of correlation between the variation of different characters," which is a surprisingly narrow *raison d'etre* for an entire discipline that can only be understood by looking closely at the writings of its founder.[179] Galton "had long been interested in the properties of the normal distribution and how it could be applied to what we now recognize as continuously varying traits such as stature."[180] Normal, Gaussian distributions, he thought, supported the notion that evolution occurred gradually through the relative success of segments of the population, while wild, random distributions supported saltationism, or evolution through sporadic "jumps." Accepting the task of empirical discovery, the biometricians quickly set out to measure the natural world, and their early efforts revealed that each species' characteristics indeed varied along the Gaussian bell-curve, confirming Darwin's original conclusions. As more and more data came in, the biometricians realized that "statistical regularities, based on ever more fine-grained analysis of correlated phenomena, could generate predictions and even guide interventions," which led them to believe that they were on the right track toward reestablishing evolution on solid scientific ground.[181]

The Mendelians were not interested in Galton's call to mathematical arms in the

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[179] Robert Olby, "The Dimensions of Scientific Controversy: The Biometric-Mendelian Debate" *The British Journal for the History of Science* 22, no. 3, Genetics, Eugenics and Evolution: A Special Issue in Commemoration of Bernard Norton (1945-1984) (Sep., 1989): 320.

[180] Nicholas W. Gillham, "Evolution by Jumps: Francis Galton and William Bateson and the Mechanism of Evolutionary Change," *Genetics* 159 (2001): 1385.

[181] Depew, *Darwinism Evolving*, 212.

natural sciences, preferring to investigate his theory that evolution occurred in discontinuous "sports." Galton had personally concluded that evolution could not occur in small, incremental steps in 1884, when he realized that his "ancestral law of heredity," which claimed that all of one's ancestors contributed proportionally to heredity, would inevitably lead phenotype variations back to the mean over time.[182] There simply had to be large leaps of change that established entirely new phenotypes. The question was how do those leaps occur? William Bateson, who would become the leading Mendelian, had struggled with this problem for years. As a graduate student, he had been an orthodox Darwinian thinker but his studies of marine habitats in isolated Russian lakes revealed no adaptation despite the presence of distinct and isolated environments. He then focused on one of the central transformations in evolutionary history, the genesis of vertebrates in an entirely invertebrate world, and became convinced that evolution was indeed episodic rather than smooth. In 1894 he wrote *Materials for the Study of Variation,* whose subtitle, *Treated with Especial Regard to Discontinuity in the Origin of Species* firmly established him as a disciple of Galton.[183] With the zeal of a convert, Bateson toured England lecturing on saltationism, during which time he came across Mendel's genetics, a theory he was "primed" to recognize as the answer to evolution's central problems due to its emphasis on discrete, mutational variations.

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[182] Although saltationism was a somewhat unorthodox position, the idea did have a respectable pedigree in evolutionary thinking. Thomas Huxley himself had counseled Darwin that "You have loaded yourself with an unnecessary difficulty in adopting *Natura non facit saltum* ("Nature does not make leaps") so unreservedly.

[183] Galton himself made the connection clear in his praise of Bateson's work, exclaiming, "It was, therefore, with the utmost pleasure that I read Mr. Bateson's work bearing the happy phrase in its title of 'discontinuous variation.'" Galton, "Discontinuity in Evolution," *Mind* 3 (1894): 362-372.

In hindsight, we know that Mendelism and Darwin are not mutually exclusive, that they are in fact mutually supportive; however, in the early twentieth-century these two schools of thought saw each other as antagonists. Perhaps this was inevitable. Gregor Mendel, the Austrian monk Mendelism is named after, certainly opposed Darwinism, as the theory of natural selection was directly associated with atheism in German-speaking countries in his lifetime.[184] In addition, there were several personal and professional differences between the leading biometricians and Mendelians that made cooperation difficult. For one, the biometricians were academic insiders, holding prestigious posts at Cambridge and London University, and thus held a personal stake in academic orthodoxy, while Bateson frequently roamed the world, teaching and researching in the United States, Russia, and even Egypt. It makes sense that he would be less attached to the status quo. Also, the biometricians prided themselves on their mathematical acumen, and Bateson, who had always struggled with math, simply could not comprehend much of their work. "Pearson's treatment is an algebraic of form and beyond me," he admitted.[185] Nonetheless, the supremely confident Bateson refused to believe calculation superseded theory in the search for knowledge: "We have been told of late, more than once, that Biology must become an exact science. The same is my own fervent hope. But exactness is not always attainable by numerical precision: there have been students of Nature, untrained in statistical nicety, whose instinct for truth yet saved them from perverse inference, from slovenly argument, and from misuse of authorities, reiterated

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[184] Depew, *Darwinism Evolving,* 220.

[185] Donald Mackenzie, "Sociobiologies in Competition: The Biometrician-Mendelian Debate," in *Biology, Medicine, and Society, 1840-1940*, ed. Charles Webster (London: Cambridge University Press, 1981), 255.

and grotesque."[186]

Politics also played a critical factor in the intractable debate. Biometrics, with its commitment to growth through gradual adaptation, appealed to conservatives who preferred small-scale reforms to the radical revolutionary proselytizing of socialists and anarchists heard throughout the crowded streets of every major Western city. Karl Pearson clearly saw the connection: "No great change ever occurs with a leap; no great social reconstruction, which will permanently benefit any class of the community, is ever brought about by a revolution. It is the result of a gradual growth, a progressive change, what we term an evolution. This is as much a law of history as of nature."[187] Further, the methodology of biometrics, with its focus on measurement and predictable variation, supported governmental efforts to manage their populations' genetic stock through eugenics—a policy supported explicitly by Pearson, who believed that August Weismann's experiments with rats had effectively put an end to notions of human improvement. Bateson, who strongly opposed the science of biometrics, found even less appeal in its social implications. He believed progress came through in bursts of genius, not plodding reform. "It is upon mutational novelties, definite favourable variations, that all progress in civilization … must depend," he claimed, convinced of a deeper truth that transcended science and society.[188] To his horror, the biometricians, whom he saw as unimaginative men kept busy in a fool's errand of measurement, wanted to cull the

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[186] William Bateson, *Mendel's Principles of Heredity: A Defence* (Cambridge: Cambridge University Press, 1902), x.

[187] Karl Pearson, *The Ethic of Freethought: A Selection of Essays and Lectures* (London: T.F. Unwin, 1888), 363.

[188] Mackenzie, "Sociobiologies in Competition," 282.

exceptional outliers from the world in an attempt to create a dystopian world of bureaucrats.

Clearly, the conflict between the biometricians and Mendelians was complex and involved myriad personal and professional factors. Over time, different authors have interpreted the tension in numerous ways, each bringing to light important details and providing helpful insights.[189] The most useful way to understand the conflict, however, is to view the participants as intellectual pioneers who had moved past the teleology of progress in the natural world but had yet to feel totally at home with probability rather than certainty as the ultimate scientific reality. That is to say, they remained committed to the notion that there was a single explanation rather than multiple valid views. Neither the biometricians nor the Mendelians could accept the logic of another paradigm, for to do so was to jettison all that was right with their own work (although recent developments in physics, most notably the double slit experiment on light, had shockingly demonstrated that reality was in fact both conditional and uncertain). Pearson captured the distance between the two camps quite well, exclaiming, "Mr. Bateson and I do not use the same language."[190] And indeed he did not, at least initially. In order to articulate Mendelian genetics, Bateson and his colleague Wilhelm Johanssen had to invent new words such as "gene," "genotype," and "phenotype." Only then did people outside the discipline have the tools to comprehend the world of heritability hidden behind physical appearances. It would take a new generation of thinkers, men entirely at

[189] An excellent summary of the debate can be found in Robert Olby's "The Dimensions of Scientific Controversy: The Biometric-Mendelian Debate," 299-320.

[190] K. Pearson, "On the Fundamental Conceptions of Biology," *Biometrika*, 1 (1902): 331.

ease with uncertainty to build a solid foundation for evolutionary biology.

The first men to lay the bricks of that foundation were an eclectic cast of characters with larger-than-life reputations. Ronald Fisher, a British statistician and biologist, demonstrated an otherworldly aptitude for mathematics at an early age. Due to his poor vision he learned to solve complex equations in his head—an ability that both frustrated and awed others who bemoaned his tendency to forego written proofs. According to evolutionary biologist Richard Dawkins, Fisher was "the greatest biologist since Darwin."[191] J.B.S Haldane, a British-Indian aristocrat, fought with the infantry in World War I and wrote Marxist articles for the *Daily Worker*. He is best known today for his pithy comments on life. For example, when asked his opinion on God he responded, "If he exists, he must have an inordinate fondness for beetles."[192] And, when contemplating the cosmos, he wrote, "My own suspicion is that the universe is not only queerer than we suppose, but queerer than we can suppose."[193] The final member of this group, the American Sewall Wright, was less obviously idiosyncratic—although he was the son of two first cousins and he wrote extensively on the effects of inbreeding. Together, these luminaries, along with others who followed their lead, developed what came to be known as the "modern synthesis," which is a nebulous term but one that contemporaries saw as the merging of antagonistic fields. Julian Huxley, who coined the

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[191] Richard Dawkins, "Who is the Greatest Biologist of All Time?" *Edge,* https://www.edge.org/conversation/who-is-the-greatest-biologist-of-all-time, accessed March 14, 2017.

[192] Stephen Jay Gould, *Dinosaur in a Haystack: Reflections in Natural History* (New York: Harmony Books, 1995), 377.

[193] Lee Ann Dugatkin, *The Altruism Equation* (Princeton: Princeton University Press, 2006), 61.

term, explained, "Biology in the last twenty years, after a period in which new disciplines were taken up in turn and worked out in comparative isolation, has become a more unified science. It has embarked upon a period of synthesis, until today it…is coming to rival the unity of older sciences like physics."[194]

These men faced many of the same obstacles establishing a consensus that the previous generation of biometricians and Mendelians did, so their success cannot be ascribed to a simple change of circumstances. In many ways, Haldane and Fisher, due to their commitment to quantitative analysis, were the natural inheritors of biometry. In "A Mathematical Theory of Natural Selection" Haldane makes this connection explicit: "A satisfactory theory of natural selection must be quantitative (for) in order to establish the view that natural selection is capable of accounting for the known facts of evolution we must show not only that it can cause a species to change, but that it can cause it to change at a rate which will account for present and past transmutations."[195] Fisher seemed to have even deeper ties to biometry. Like Pearson before him, he was primarily a statistician and became involved in evolutionary theory indirectly, in his case after reading the classic biometric paper, "Mathematical Contributions to the Theory of Evolution."[196] Over the years he developed a friendship with the aging Pearson, and would often submit his papers to the elderly biometrician for feedback and praise. It

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[194] J.S. Huxley, *Evolution, the Modern Synthesis* (London: Allen and Unwin, 1942), 26.

[195] J.B.S. Haldane, "A Mathematical Theory of Natural and Artificial Selection," *Transactions of the Cambridge Philosophical Society* 22 (1924): 19.

[196] Karl Pearson, "Mathematical Contributions to the Theory of Evolution," *Philosophical Transactions of the Royal Society of London* 187, no. 3 (1896), 253-318.

would have been all too easy for Fisher to follow in Pearson's footsteps and to continue denying Mendelism had any legitimacy. Likewise, Sewall Wright seemed perfectly poised to carry the mantle of Mendelism, for he was also a geneticist whose "home-made" knowledge of mathematics hindered his ability to meaningfully critique the quantitative methods being championed as the future of the discipline.[197]

What differentiated these scholars from their predecessors was not the benefit of more amenable personalities nor a reduction in academic politics, but a shared recognition that "at rock bottom the world is governed in significant measure by laws of chance."[198] How to explain such a drastic change of perspective? The historians of the philosophy of science, David Depew and Bruce H. Weber, explain: "By the end of the nineteenth-century, Newton's luminous explanation of the system of the world had been honorifically retired as an exemplar of great physics. Two new, but closely related, paradigm cases had taken its place: Maxwell's reduction of the phenomenological gas laws, relating temperature, pressure, and volume to statistically calculable collisions between millions of molecules, and hard on its heels, Boltzmann's reduction of thermodynamics to more or less probably arrays of molecular motion."[199] As a result, the new generation of thinkers (which included Fisher, Haldane, and Wright in the biological sciences as well as the founders of quantum mechanics, Niels Bohr, Max Planck, Albert Einstein, Werner Heisenberg, and Erwin Schrodinger in physics) assumed

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[197] J.F. Crow, "Sewall Wright's Place in Twentieth-Century Biology," *Journal of the History of Biology* 23 (1990): 57-89.

[198] Depew and Weber, *Darwinism Evolving,* 254.

[199] Ibid., 254.

unpredictability and irreversibility in the world around them.

The intellectual debt to the Second Scientific Revolution owed by the founders of the modern evolutionary synthesis is apparent with a close reading of their work. Fisher, for example, wrote that "It is often convenient to consider a natural population not so much as an aggregate of living individuals but as an aggregate of gene ratios"; further, he treated those gene ratios in the same manner Maxwell and Boltzmann treated arrays of gas molecules.[200] He explained his novel approach to evolutionary theory in a lecture to the Royal Society of Edinburgh in 1922: "the investigation of natural selection may be compared to the analytic treatment of the Theory of Gases, in which it is possible to make the most varied assumptions as to the accidental circumstances, and even the essential nature of the individual molecules, and yet to develop the general laws as to the behavior of gases."[201] Sewall Wright likewise borrowed liberally from his predecessors in physics. He adopted the concept of "adaptive landscapes," which imagines evolutionary fitness as physical topography of relative adaptability, from Boltzmann's "gradients" in thermodynamics, and he, like Maxwell and Boltzmann, preferred to speak in terms of populations and probability rather than individual entities and certainty. His language in a review of Fisher's work demonstrates this affinity, "In such a population we can not speak of single equilibrium values but of probability arrays for each gene."[202]

Because Fisher, Haldane, and Wright operated from within a new scientific

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[200] Ibid., 246.

[201] R.A. Fisher, "On the Dominance Ratio," *Proceedings of the Royal Society of Edinburgh* 42 (1922): 321-322.

[202] Sewall Wright, "The Genetical Theory of Natural Selection: A Review," *Journal of Heredity* 21 (1930): 354.

paradigm, they were less beholden to the antagonisms of the past. Many of the supposed contradictions between natural selection and genetics simply melted away when viewed through the lens of populational genetics, which transformed the vitriolic contest for intellectual supremacy that took place between biometricians and Mendelians into an irrelevant squabble. Therefore, the first step in their journey to establish a new foundation for evolutionary biology was to establish the compatibility of the former rival disciplines. After analyzing Pearson's data on the inheritance of physical characteristics among human beings, Fisher concluded, "the hypothesis of cumulative Mendelian factors seems to fit the facts very nicely."[203] He then sent his findings to his old mentor, who exclaimed (without even reading the paper), "I am afraid I am not a believer in cumulative Mendelian factors as being the solution to the heredity puzzle."[204]

Apparently there was no bringing the old guard with them, so Fisher and his colleagues continued to dismantle the old conflict on their own. Haldane, in a submission to *Nature* in 1929, succinctly stated their new, conciliatory perspective: "Quantitative work shows clearly that natural selection is a reality, and that, among other things, it selects Mendelian genes, which are known to be distributed at random through wild populations, and to follow the laws of chance in their distribution to offspring. In other words, they are an agency producing variation of the kind which Darwin postulated as the raw material upon which natural selection acts."[205] In a 1927 address to the Etymological

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[203] R.A Fisher, "The Correlation between Relatives on the Supposition of Mendelian Inheritance," *Transactions of the Royal Society of Edinburgh* 52 (1918): 433.

[204] E.S. Pearson, "Some Early Correspondence Between W.S. Gosset, R.A. Fisher, and Karl Pearson, With Notes and Comments," *Biometrika* 5 (1968): 456.

[205] J.B.S. Haldane, "Natural Selection," *Nature* 124 (1929): 444.

Society of London, Fisher argued "It is now becoming increasingly widely understood that the bearing of genetical discoveries, and in particular of the Mendelian scheme of inheritance, upon evolutionary theory is quite other than that which the pioneers of Mendelism originally took it to be (which was support for saltationism as an alternative to natural selection)."[206]

Over the next few years each of the founders of the modern synthesis worked to mend the needless rift between Mendelism and natural selection. Fisher wrote his classic 1930 *The Genetical Theory of Selection* largely "to demonstrate how little basis there was for the opinion…that the discovery of Mendel's laws of inheritance was unfavorable, or even fatal, to the theory of natural selection."[207] In 1931, Wright recognized that it was "not surprising that the phenomena of Mendelian heredity were looked upon as confirming de Vries' theory (of saltationism)," because of the exiting animus toward traditional Darwinism, yet he believed the time had come to reverse course, so he wrote a long paper titled "Evolution in Mendelian Populations" to accomplish that task. Finally, in 1932 Haldane published *The Causes of Evolution* with the intent to, once and for all, "dispel the belief that Mendelism had killed Darwinism."[208] In *The Causes of Evolution's* closing statement, he argues that evolutionary biology could stop dwelling on the misguided dispute between biometricians and Mendelians and again look forward to a

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[206] R.A. Fisher, "On Some Objections to Mimicry Theory; Statistical and Genetic," *Transactions of the Entymological Society of London* 75 (1927): 269.

[207] R.A. Fisher, "Retrospect of the Criticisms of the Theory of Natural Selection," *Evolution as a Process*, eds. Julian Huxley, A.C. Hardy, and E.B. Ford (New York: Collier Books, 1963), 104.

[208] William Provine, *The Origins of Theoretical Population Genetics* (Chicago: University of Chicago Press, 1971), 174.

bright future. He wrote, "The permeation of biology by mathematics is only beginning, but unless the history of science is an inadequate guide, it will continue, and the investigations here summarized represent the beginning of a new branch of applied mathematics."[209]

The founders of the modern synthesis did not agree on everything. Much like the "founding fathers" of the United States, their association is due more to a shared vision of the big picture than to identical thoughts. Fisher conceived of an animal species in abstract, numerical terms, perhaps due to his training as a statistician. Further, he and Haldane, who also had a mathematical background, sought to transform "natural selection into a highly general, law-governed theory of evolution that could complete and supplant Darwin's account…in the new age of post-Newtonian physics."[210] They theorized, consequently, that natural selection acted most effectively in large, randomly breeding populations (much like the numerous and indeterminate interactions of gases). This theory ensured enough variation among genes to drive evolutionary change and facilitated quantitative analysis by reducing the members of each species to the analog of a particle. Wright, however, had worked intimately with animals, and knew from experience that animals did not live or breed like that. He claimed that animals typically bred in small populations such as a wolf pack or a murder of crows.[211] When Fisher

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[209] J.B.S. Haldane, *The Causes of Evolution* (London: Longmans, Green, 1932), 215.

[210] Depew, *Darwinism Evolving*, 244.

[211] A different example might have painted a clearer picture for the reader, but I could not resist the opportunity to reference one of my favorite terms, the "murder" of crows, which is the collective noun for these fascinating birds.

argued that small populations did not have enough genetic diversity for evolution through natural selection to occur, Wright responded that small populations allowed for mutations to become established in a process known as "genetic drift," and that genetic diversity was to be found not simply in the number of different genes under selection but also in the complex networks genes formed with one another.[212] Selection, instead of operating upon single genes, operated upon entire genetic interaction systems, which explained why "when selection acted directly upon some parts of an organism, it acted indirectly on others."[213]

Wright and Fisher's debates persisted throughout their careers, and their disagreements were significant and over matters of fundamental importance; however, as founders of the modern synthesis, they, along with Haldane, had restored the credibility of evolutionary biology. By approaching evolution through the prevailing post-Newtonian scientific paradigm of probability, they were able to move past the acrimonious divisions of the past and to establish the primacy of natural selection. In so doing, they established a new Darwinian paradigm in which a productive, Hegelian scientific discourse could take place. Within a short time, men inspired by the insights of populational genetics would develop the modern synthesis even further in what has come to be known as the "late synthesis." Theodosius Dobzhansky, Ernst Mayr, and Gaylord Simpson popularized the modern evolutionary synthesis by applying the theoretical

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[212] The logic behind Wright's reasoning is quite simple. Small populations are more likely to harbor and perpetuate random mutations for the same reason it is more likely to flip "heads" in a coin toss five times in a row than fifty times. This is known as the Law of Averages.

[213] Provine, *The Origins of Theoretical Population Genetics*, 163.

insights of their predecessors to case studies in the wild and by incorporating paleontology, which had previously been a recalcitrant supporter of natural selection, into the consensus.

Born in 1900 in present day Croatia, Dobzhansky's formative training took place within the tradition of fieldwork prevalent in the Russian Empire's scientific community. Thus, he was naturally skeptical of the lab results that dominated population genetics, and upon arriving in the United States in 1927 he set out to conduct field experiments to verify the theory's veracity in the "real world." During extensive travels from Canada to Mexico he found that members of a species do not share identical genes—a fundamental assumption of Fisher's and Haldane's, who believed genetic consistency must be present in a species if they were to successfully replace the previous emphasis on phenotypic conformity. The species he studied, Drosophila Pseudoobscura, or "fruit fly," actually had quite different genes in different populations, and each population bore distinctive markers in its chromosomes that distinguished it from other populations. In *Genetics and the Origin of Species,* Dobzhansky demonstrated that the theoretical brilliance of the modern synthesis must also take into consideration geographical variation to be complete. As an additional contribution, Dobzhansky was able to communicate the complex mathematics of population genetics into laymen's terms, so he was able to introduce a wide range of biologists to the modern synthesis who had remained outside its influence due to technical limitations.

Genetics and the Origin of Species had a tremendous influence on an ornithologist from Germany working in New Guinea at the time named Ernst Mayr. Previously, Mayr held vague notions about the mechanism of evolution, but favored a sort of Lamarckism

because he, like a number of biologists, did not think natural selection was able to generate enough phenotypic change to establish a new species. The work of the population geneticists had remained beyond his capabilities (advanced statistics and genetics were entirely different disciplines, after all), and he was unimpressed by any theory of nature that did not deal directly with wild animals. Dobzhansky's merging of genetics and natural history, however, appealed to Mayr immediately, for it solved problems he faced in his research. Mayr had specialized in discovering new species of birds and mapping out their ranges. This was not an easy task, for a single species of bird can have tremendous phenotypic variation. On one mountain, for example, a bird may have a long tail or exhibit certain coloration, but on another mountain have short tails and be another color. The numerous subspecies of birds he discovered proved to be both a serious logistical and theoretical problem. Dobzhansky solved Mayr's categorization difficulties in one fell swoop by redefining what it meant to be a "species." In Darwin's era, many scholars struggled to accept evolution because they recognized a species as a fixed entity. These men were subconsciously committed to an Aristotelian vision of the earth comprising complimentary, discrete entities, and their perspective continued to influence biology until the modern synthesis. Inspired by the populational perspective of Fisher and his peers, Dobzhansky argued for a different conception of species. He claimed that a species exists "when a once actually or potentially interbreeding array of forms becomes segregated into two or more separate arrays which are physiologically incapable of breeding."[214] In other words, a species was a process, not a static entity, and

[214] Theodosius Dobzhansky, *The Genetics and the Origin of Species* (New York: Columbia University Press, 1937), 312.

the salient attribute was the ability to mate, not physical, or even genetic, similarity. From this point of view, animal species were not an amalgam of characteristics (e.g., elephants have grey skin, tusks, trunk, etc.,), but were instead best seen as a group of potentially interbreeding populations that existed in particular geographical and historical contexts.

Mayr approved of Dobzhansky's populational definition of species because it reinforced his belief that environmental context plays a large role in the development of a species. Fisher's abstract, mathematical vision of a species as a large collection of genes interacting like subatomic gases in a vacuum might have reconciled natural selection with genetics, but it failed to take into account a fundamental characteristic of nature: the habitat in which the animal lived (Mayr condescendingly referred to Fisher's view as "beanbag genetics").[215] How, for example, could Fisher explain the numerous subspecies of birds if genetic dispersion were truly random? By thinking of species as Dobzhansky did, as "distinct spatiotemporal entities with reasonably well-marked beginnings and endings and finite geographic and ecological ranges," subspecies were no longer a problem for Mayr.[216] Instead, they were living testimony to the evolutionary process. In Mayr's 1942 *Systematics and the Origin of Species,* he demonstrated how geographical isolation led to the origin of a new species as each derivative population experiences its own genetic mutations and inbreeding until the two populations become incapable of mating with each other even in the case of reunification.

Another influential scientist in the "late" synthesis was Gaylord Simpson, whose

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[215] Ernst Mayr, "Where are We?" *Cold Spring Harbor Symposia on Quantitative Biology* 24 (1959): 1-14.

[216] Depew, *Darwinism Evolving*, 309.

research on horse fossils put an end to paleontology's stubborn commitment to orthogenetic evolution. This was a significant challenge, for paleontologists worked directly with physical evidence (fossils) and what they saw contradicted the theory of natural selection. To their eyes, goal-oriented "macroevolution" clearly occurred at the higher taxonomic orders, even if on the level of species natural selection and adaptation led to random, context-specific evolution. For evidence, they pointed to the lack of transitional fossils. If indeed natural selection was guiding all evolution, there should be a fossil record of animals in each phase of development. Instead, however, an increasingly thick fossil record revealed "jumps" from one phenotype to another, more "advanced" form. For example, single-celled organisms existed without much change for billions of years and then, suddenly, around five hundred million years ago much of today's phyla emerged during the Cambrian explosion. It was hard not to see animals capable of flight or social networks as objectively more advanced than their bacterium predecessors.

Simpson detested orthogenetic explanations of evolution because he believed they were guided by a metaphysical teleology of progress rather than leading scientific principles. Raised in a strict Protestant home, Simpson developed strong antireligious sentiment as a child, resulting in a lifelong determination to remove any trappings of mysticism from his chosen discipline of paleontology. The modern synthesis had effectively established natural selection as the orthodox scientific explanation for evolution by this point; therefore, when confronted with evidence for punctuated and purposeful evolution, Simpson used the logic of the synthesis to form a rebuttal.

To explain evolutionary "jumps," Simpson turned to Sewall Wright's concept of "genetic drift." Wright claimed that smaller populations had a higher statistical

probability of developing a particular trait (think how much more likely it is to flip heads on a coin eight out of ten times versus eighty out of a hundred), and thus evolution would occur more rapidly in small, isolated populations. Simpson argued that the predictable result of evolution occurring rapidly in small populations was a dearth of transitional animals in the fossil record. There were no "jumps," just evolution via natural selection occurring at different speeds in different context in a process he termed "quantum evolution."[217] But what about the apparent progression paleontologists saw in the fossil record? Using Fisher and Haldane's quantitative method, Simpson demonstrated that evolution in fact took place in the irregular and undirected manner predicted by Darwinism. Any purpose or goal that previous paleontologists thought they saw was a reflection of their own values and not an objective depiction of reality.

By using the tools of the modern synthesis to undermine support for alternatives to natural selection, Simpson completed the synthesis in an important sense. Fisher, Haldane, and Wright had introduced population genetics, which ended the bitter dispute that had kept evolutionary theory divided. Then Dobzhansky and Mayr combined the theoretical and quantitative tools of population genetics with the geographical and environmental insights of natural history. Now, Simpson had brought paleontology into the fold, turning the synthesis into a consensus in which it was possible for scientists of all disciplines to operate productively. In the course of developing the modern synthesis, many of the major questions of evolutionary theory had been answered. What drove evolution? Natural selection. How did it happen? Genes mutated, some of which

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[217] George Gaylord Simpson, *Tempo and Mode in Evolution* (New York: Columbia, 1944), 206. Note the use of scientific terminology associated with the second scientific revolution.

conferred a relative advantage. Where did evolution occur? Everywhere, all the time, but it happened more rapidly in small, geographically isolated populations. The last remaining, major question was "Who?" Whom did natural selection operate upon, individuals, groups, or the species? The architects of the modern synthesis provided ambiguous, and at times contradictory, support for each of these plausible answers.[218] The debate to solve this question would define the immediate postsynthesis world of evolutionary biology, and in the process establish the scientific foundation for the return of evolutionary thinking in the social sciences.

Fisher, Haldane, and Wright believed evolution took place at the level of the gene. This was central to their model of evolution, which, remember, had solved the conflict between biometricians and Mendelians by merging genetics with natural selection. To them, genetic mutations provided the phenotypic diversity that drove natural selection; thus, evolution occurred at the gene level. It was tautological. Although they rarely commented explicitly about which level evolution took place, their writing makes this basic assumption clear. Here is Fisher, writing in 1922, "It is often convenient to consider a natural population not so much as an aggregate of living individuals but as an aggregate of gene ratios."[219] The architects of the latter phase of the modern synthesis, however, did not make the same assumption.

Because of his experience as a naturalist, Dobzhansky emphasized the

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[218] Historian of science Greg Mitmann writes, "(M)ost biologists by the 1940's believed natural selection to be the causative agent behind evolutionary change, still the question of what level(s) selection operated on remained a highly contested and unresolved point. *State of Nature* (Chicago: University of Chicago Press, 1992), 111.

[219] R.A. Fisher, "On the Dominance Ratio," *Proceedings of the Royal Society of Edinburgh* 42 (1922): 340.

environmental context in which evolution took place. Unlike the statisticians Fisher and Haldane, who viewed gene fluctuations in abstract mathematical terms, he recognized that animals lived in a tremendously diverse and changing ecological theater, which led him to focus on evolution at a different stratum: the species. According to Dobzhansky,

> The environment does not remain constant, either in terms of geological periods or even from one year to the next. Selection and mutation rates, and hence genetic equilibria, are therefore in a state of perpetual flux. The nature of the genetic mechanisms is therefore such that the composition of the species population is probably never static. A species that would remain long quiescent in the evolutionary sense is likely to be doomed to extinction.[220]

Here he has acknowledged the importance of "mutation rates" among genes, but he also implied that genetic mutations and variability serve the larger purpose of species adaptability. To understand why he arrived at that slightly teleological conclusion, it is helpful to know that Dobzhansky was a fierce advocate of pluralistic, democratic societies. Progress to him, whether for an animal species or a modern nation, came through diversity and change, not the conservation of previously successful traits. And while Dobzhansky might have been subconsciously conflating his political values for biological truth, he was not alone in calling for a re-evaluation of the gene as the fulcrum of evolution.

Ernest Mayr spent the majority of his scientific career observing birds in nature. Subsequently, he strongly opposed evolutionary theories that did not take into consideration the environment. He thought that Fisher and his colleagues had focused on genes because they suffered from "physics envy" and it was easy to see genes as analogs

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[220] Theodosius Dobzhansky, *The Genetics and the Origins of the Species* (New York: Columbia University, 1937), 179.

to particles. Reality, according to Mayr, was rougher, messier, and at the same time more accessible. One need not rely on complex equations or sophisticated laboratory experiments; it was possible to study the animal itself, for actual physical bodies in a challenging environment is where the rubber hit the road in evolutionary theory. "Natural Selection favors (or discriminates against) phenotypes, not genes or genotypes. Where genotypic differences do not express themselves in the phenotype (for instance, in the case of concealed recessives), such differences are inaccessible to selection and consequently irrelevant."[221] Mayr's arguments against genotype evolution struck a chord among those who longed for old-fashioned, common sense biology, and he would reiterate the same basic claims throughout his career. As late as 1984 he could be found declaring that "(t)he target of selection does not consist of single genes, but rather of such components of the phenotype as the eye, the legs, the flower, the thermo-regulatory or photosynthetic apparatus, etc."[222]

So, where did evolution take place? It was not possible to turn to Darwin for answers, for the patriarch of evolution himself had conflicting views on the matter. Of course, Darwin did not argue for evolution at the level of the gene because he was unaware that genes existed. He did, however, vacillate between evolution at the level of the individual and the species or group. Here he is in *On the Origin of Species* discussing the Malthusian struggle at the heart of evolution: "More individuals are born than can

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[221] Ernst Mayr, *Animal Species and Evolution* (Boston: Harvard University Press, 1963), 184.

[222] Ernst Mayr, "The Unity of the Genotype" in *Genes, Organisms, Populations: Controversies over the Units of Selection,* eds. R.N. Brandon and R.M. Burian (Cambridge: MIT Press, 1984), 76.

possibly survive. A grain in the balance will determine which individual shall live and which shall die."[223] Yet, certain phenomena in nature such as sterile castes and self-sacrificing behavior compelled Darwin to also advocate group selection at times.[224] For bees, he speculated that "the sterile conditions of certain members of the community has been advantageous to the community: consequently the fertile males and females of the same community flourished, and transmitted to their fertile offspring a tendency to produce sterile members having the same modification."[225] And he explained self-sacrifice similarly: "It must not be forgotten that although a high standard of morality gives but a slight or no advantage to each individual man and his children over the other men in the same tribe, yet that an advancement in the standard of morality and an increase in the number of well-endowed men will certainly give an immense advantage of one tribe over another."[226] The answer to the question of what level natural selection took place remained just out of reach.

Then, in the early 1960s a British zoologist named V.C Wynne-Edwards published an influential book purporting to settle the issue once and for all in favor of group selection. Born in 1906 to the headmaster of Leeds Grammar School, young

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[223] Darwin, *On The Origin of Species*, 293.

[224] In one sense, the binary framing of Darwin's thinking, "either individual or group," is misleading, for it is not certain that he saw the two as competing rather than complimentary concepts. Many multiselectionist thinkers today such as David Sloan Wilson have argued that many of the preeminent evolutionary theorists were mistakenly labeled as antigroup selectionists during the "hardening" of the modern synthesis that occurred in the 1970s.

[225] Darwin, *On the Origin of Species*, 238.

[226] Darwin, *On the Origin of Species,* 166.

Wynne-Edwards was exposed to natural history from an early age, and his thirst for scientific inquiry and exploration solidified into a career choice after listening to Sir Ernest Shackleton deliver a lecture on his upcoming (and ultimately fatal) expedition to Antarctica in 1922. For the next twenty-five years, Wynne-Edwards divided his time between academic responsibilities on campus and field research in one of the world's wildest and most remote places, the Arctic. Like Peter Kropotkin before him, the struggle for survival he witnessed took place primarily between animals and nature, not between the animals themselves like Darwin and Wallace had seen in the lush tropical climes they encountered on their journeys. In an article written for the journal *Auk,* he explained, "Except perhaps among carnivorous predators, competition between individuals for space and nourishment seems commonly reduced to a low level among members of the Arctic flora and fauna…In the Arctic the struggle for existence is overwhelmingly against the physical world."[227]

During the course of his experiences in the Arctic, Wynne-Edwards came across a situation that problematized his pre-existing faith in individual selection: an inexplicable breeding restraint among fulmars, which are a type of seagull typical to the area. Clearly, the individual birds that withheld procreation were not maximizing their progeny, so the traditional Darwinian tropes about "survival of the fittest" fell short. For the time being he had no alternative explanation for this queer phenomenon, but it remained an itch that needed to be scratched. Then, years later, after discovering population genetics and the modern synthesis, Wynne-Edwards felt he had the insight he needed to make sense of the bird's paradoxical breeding patterns: individual fulmars were not rearing chicks because

[227] V.C Wynne-Edwards, "Zoology of the Baird Expedition," *Auk* 69 (1952): 384.

it benefited the group to manage their population in an environment with limited resources. Flush with enthusiasm, he delivered a paper to the Oxford Ornithological Society explaining how the modern synthesis led him to his novel conclusion, "The fundamental new idea is that populations, rather than independent individuals, are the basic units upon which evolutionary processes act."[228]

Clearly Wynne-Edwards considered his work a continuation of the modern synthesis and not a radical breach from accepted evolutionary theory. While at Oxford, his mentor was none other than Julian Huxley, the man who literally wrote the book *The Modern Synthesis*. What's more, Dobzhansky, Mayr, and Simpson, all luminaries in their respective fields and pillars of the modern synthesis, had previously theorized about selection at a level above the individual. Mayr's *Systematics and the Origin of Species* provides a good example of the theory's precedence in his own work, "Darwin thought of individuals when he talked of competition, struggle for existence among variants, and survival of the fittest in a particular environment. Such a struggle among individuals leads to a gradual change of populations, but not to the origin of new groups. It is now being realized that species originate in general through the evolution of entire populations."[229] What differentiated Wynne-Edwards from his predecessors was the scale in which he envisioned group selection operating. Unlike Mayr and the others, who believed group selection was complementary to individual selection, he believed the group to be *the* level at which evolution occurred. "For everything concerning population

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[228] V.C. Wynne-Edwards, "The Nature of Subspecies," *Scottish Naturalist* 60 (1948): 195-196.

[229] Ernst Mayr, "Systematics and the Origin of Species," ed. L.C Dunn, *Columbia Biological Series* (New York: Columbia University Press, 1942), 190.

dynamics, (group selection) is much more important than selection at the individual level. The latter is concerned with the physiology and attainments of the individual as such, the former with the viability and survival of the stock or race as a whole. Where the two conflict, as they do when the short-term advantage of the individual undermines the future safety of the race, group selection is bound to win, because the race will suffer and decline, and be supplanted by another in which antisocial advancement of the individual is more rigidly inhibited."[230] In 1962, Wynne-Edwards published his tome, *Animal Dispersion In Relation to Social Behavior*, which he modeled after Darwin's *On the Origin of Species*. The book, magisterial in its length, scope of analysis, and eminence of its author, proved a resounding success in establishing the primacy of group selection.

The success of *Animal Dispersion*, however, caused considerable consternation among a small number of evolutionary biologists. Scientists are human, and there is bound to be some level of resentment or jealousy whenever a colleague achieves widespread acclaim—especially for a rival theory, which would only diminish the relative importance of your own work. And while the conflict surrounding *Animal Dispersion* was certainly ripe with academic posturing, there was more to it; these men believed Wynne-Edwards had betrayed the very principles the discipline was founded on. Darwinism, according to them, held evolution to be the result of natural selection among diverse individual phenotypes caused by small genetic mutations. The painstaking quantitative analysis of Haldane and Fisher had established that fact. And it was now their responsibility to ensure that the errant speculations of a lone British ornithologist

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[230] V.C. Wynne-Edwards, *Animal Dispersion in Relation to Social Behavior* (Edinburgh: Oliver and Boyd, 1962), 20.

did not derail evolutionary biology.[231]

The first matador who stepped into the ring to kill the Wynne-Edwardsian bull was David Lack, another British ornithologist of similar age who also considered Julian Huxley a friend. While Wynne-Edwards was studying fulmars in the Artic, Lack was studying finches in the Galapagos Islands, where he witnessed far more individual competition than his peer and soon-to-be rival. At the conclusion of his trip to the Galapagos, Lack spent several months processing his research with Ernst Mayr in the United States. During this time he solidified his convictions that environmental context was critical to evolution and that natural selection dealt with phenotypes rather than genotypes. Unlike the elder and more established Mayr, however, Lack remained committed to the individual as the level of selection.[232] Therefore, when he heard about the incredible popularity of *Animal Dispersion* (which he explained as the result of "ignorance by other biologists"), he felt compelled to respond.[233]

Immediately after the publication of *Animal Dispersion*, Lack's friend Charles Sibley implored him, "This matter (group selection) needs to be exposed as the nonsense it is—and you're the one to do it!"[234] Despite Wynne-Edwards' efforts to associate his

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[231] John Maynard Smith, "In Haldane's Footsteps" in *Studying Animal Behavior: Autobiographies of the Founders*, ed. Donald A. Dewsbury (Chicago: University of Chicago Press, 1985), 352.

[232] Mark Borrello, *Evolutionary Restraints: The Contentious History of Group Selection* (Chicago: University of Chicago Press, 2010), 95.

[233] David Lack, *Population Studies of Birds* (Oxford: Clarendon Press, 1966), 311.

[234] Letter from Charles Sibley to David Lack, David Lack Papers, Alexander Library, Edward Grey Institute, box 10, file 223. Quoted in Borrello, *Evolutionary Constraints*, 96.

work with Dobzhansky and Wright before him, Sibley thought Wynne-Edwards had strayed from the path of orthodox evolutionary biology by espousing group selection: "I am fascinated to see how rapidly a person goes under and drowns as soon as he lets go of the firm rock of natural selection. In Wynne's case, the paradox is that he doesn't realize that he has let go of the rock."[235] Needing no further encouragement, Lack began writing *Population Studies of Birds*, which he saw as the definitive rebuttal of group selection.[236] Essentially, he argued that there were equally plausible explanations for the small clutch sizes Wynne-Edwards had observed that did not require one to theorize outside the accepted doctrine of individual self-interest. Wynne-Edwards claimed that powerful birds policed others to do what was in the best interest of the group much like human beings regulated others to prevent overfishing or overgrazing; however, Lack reasoned, was it not more reasonable to assume individual birds restricted their reproduction in response to indicators that their offspring might not survive in high numbers?[237] It was, after all, the number of offspring that reached sexually maturity that mattered from an evolutionary perspective, not simply how many are born.

The lines in the sand were now drawn. The battle to determine at which level

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[235] Ibid.

[236] In fact, Lack was already professionally and personally invested in group selection by this time. While developing his theory of group selection, Wynne-Edwards had negatively reviewed a book that Lack wrote explaining bird behavior through the lens of individual self-interest.

[237] Wynne-Edwards was influenced by his time as a government consultant for the fisheries industry, where he learned firsthand the importance of managing populations.

evolution occurred had distilled to a choice between individual and group selection. Lack, representing the individual selection camp, repeated his argument that "clutch size has evolved through natural selection to correspond with the largest number of young for which the parents can on average find enough food. In this view, the upper limit of clutch size is set by the fact that, with more young, some are undernourished, and so the parents tend to leave fewer, not more, descendants than those with broods of normal size."[238] Wynne-Edwards' time as a field naturalist, however, had demonstrated unequivocally that "animals often exist in the midst of plenty, (but) starvation is rare."[239] It was, therefore, not the pressures of nature that kept populations in check. It was a result of a species' self control. "Such density differences," he wrote, "arise from the activities of the animals themselves, and this implies that population-density is subject to effective internal control, i.e., it is self regulating."[240] Flocks of birds, schools of fish, and swarms of insects were all examples of means by which a species assesses the size of their populations from this point of view.[241]

Here, one can see why Sibley, Lack, and others believed Wynne-Edwards had abandoned Darwinism. His theory is reminiscent of Lamarckian self-determination and appears hostile to the influence of natural selection. To the contrary, Lack makes explicit

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[238] David Lack, *The Natural Regulation of Animal Numbers* (Oxford: Clarendon Press, 1954), 22.

[239] Timothy Shanahan, The Evolution of Darwinism: Selection, Adaptation, and Progress in Evolutionary Biology (Cambridge: Cambridge University Press, 2004), 44.

[240] V.C. Wynne-Edwards, "The Control of Population-Density Through Social Behavior: A Hypothesis," *Ibis* 101 (1959): 440.

[241] Shanahan, *The Evolution of Darwinism,* 46.

reference to orthodox Darwinism in his explanation for why group selection cannot work. In *The Natural Regulation of Animal Numbers* he argued, "Natural selection operates on the survival-rate of the offspring of each genotype. If one type of individual lays more eggs than another and the difference is hereditary, then the more fecund type must come to predominate over the other."[242] Appeals to convention, though, would not persuade Wynne-Edwards, who, while inspired by the modern synthesis, was not bound by its strictures. He believed there were significant limitations to individual selection. For example, he wrote that Lack's analysis failed to explain the presence of nonbreeding birds or why sexual maturity was more often deferred in males when females carry more of the reproductive capability.[243] More importantly, perhaps, he was willing to chart unknown waters if that is where the truth lie.[244] The preface to *Animal Dispersion* anticipated and accepted the anxiety his theoretical audacity was sure to generate among his colleagues, "Needless to say, the reader is confronted with two or three fundamental principles that, on account of unfamiliarity alone, he may be expected to eye with a certain amount of skepticism, until they can by degrees be critically appraised in the light of each succeeding chapter."[245]

There seemed to be no common ground, no way in which both theories could

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[242] Lack, *The Natural Regulation of Animal Numbers*, 22.

[243] Borrello, *Evolutionary Restraints,* 103.

[244] Wynne-Edwards was encouraged to push the theoretical envelope by his mentor, Charles Elton, who wrote to him "We are all a bit tired of the present dogmas." Quote found in Mark Borrello's "Synthesis and Selection: Wynne-Edwards' Challenge to David Lack, *The Journal of the History of Biology*, Vol. 36, No. 3 (Autumn, 2003): 44.

[245] Wynne-Edwards, *Animal Dispersion*, v.

work together. One had to support either individual or group selection. To make matters more difficult, some believed that Wynne-Edwards had brought into question the role of natural selection by advocating internal mechanisms for population control. This meant that those scientists who remained committed to natural selection as the primary mechanism of evolution found themselves supporting Lack for reasons outside the debate between individual and group selection. As the two camps began to resemble political coalitions, disparaging remarks towards the "other" became common (although, to their credit, Lack and Wynne-Edwards themselves largely refrained from this behavior). For example, the American evolutionary biologist George Williams, who sided with Lack because Lack "believed, as decisively as I did, that natural selection is a real scientific theory" wrote, "the subject requires great care to avoid the appearance of sarcasm or ridicule. I know that when I got to the part about the epideictic function of the vertical movement of plankton I suddenly wondered if I had fallen for a really elaborate joke."[246] It appeared that evolutionary biology was in danger of entering another era of protracted dysfunction similar to the biometric/Mendelian conflict of an earlier generation.

Academic conferences on the subject turned into partisan contests, as Lack and his supporters presented a unified front of opposition to Wynne-Edwards' theory of group selection.[247] At the annual British Ornithological Union, Lack's men showed up en

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[246] George C. Williams, *Adaptation and Natural Selection: A Critique of Some Current Evolutionary Thought* (Princeton: Princeton University Press, 1966), x.

[247] "I have witnessed widespread dogma only three times in my career as an evolutionist, and nothing in science has disturbed me more than ignorant ridicule based only on a desire or perceived necessity to follow fashion; [the first of these was] the hooting dismissal of Wynne-Edwards and group selection in any form during the late 1960s and most of the 1970s." Stephen Jay Gould, "The Uses of Heresy: An Introduction to Richard Goldschmidt's The Material Basis of Evolution." *Material Basis of Evolution*

masse. George Dunnett, a student of Wynne-Edwards, complained, "There is no doubt that these people…came prepared to object strongly to your paper."[248] According to Dunnett, one of them "devoted the first half of his paper to an attack of your ideas, which by means of oratorical technique, seemed to carry the audience. *It was not a nice or good attack* (emphasis mine)."[249] Another sympathizer with the beleaguered scholar expressed frustration that Wynne-Edwards' "whole concept is rejected out of hand, indeed … is laughed to scorn."[250] For his part, Wynne-Edwards decided to take what he saw as the high road, which meant to ignore his critics and continue presenting his views. Unfortunately, this response only added fuel to fire, as Lack's supporters claimed, rightly so, that Wynne-Edwards was not responding to their critiques. Not for the last time, egos and unwavering certainty had led to a scientific standstill.

The breakthrough to the impasse would come from an unexpected direction. Working alone, and supporting neither individual nor group selection, a graduate student at Oxford named William Hamilton determined that the gene, in fact, was the primary level at which selection took place. Born in Cairo, Egypt in 1936, Hamilton's early life makes his later professional iconoclasm seem normal, even predictable. His parents, an engineer and doctor from New Zealand, blessed him with a gifted analytical mind

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(New Haven: Yale University Press, 1982), xv.

[248] Borrello, "Synthesis and Selection: Wynne-Edwards' Challenge to David Lack," 549.

[249] Ibid., 549.

[250] Ibid., 551.

capable of pondering a single subject for days at a time. They also cultivated in him the joy of independent learning by giving him tremendous autonomy at a young age to explore. He and his siblings were exposed to different cultures, allowed to roam the wilderness without supervision, and given books of all sorts to read.[251] One such book, by the nineteenth-century entomologist Jean Henri Fabre, left a lasting impact on young Hamilton. "I was completely enthralled," he reminisced, "trying to imagine genes for all the behaviors he reported."[252] Of course, an intrepid youth will occasionally misstep when venturing from the beaten path, and in Hamilton's case his mother and father's laissez faire approach to parenting resulted in the loss of several fingers on his right hand—casualties to an experiment with explosives in his backyard. But the missing digits were a small price to pay if indeed these early efforts at trial and error prepared Hamilton to enter the vaunted halls of Cambridge with the temerity to challenge accepted scientific principles.

During Hamilton's first year at Cambridge he spent countless hours browsing in the library, as he preferred learning on his own to attending lectures. Then, one day he came across a book that would establish the trajectory for his entire academic career, R.A Fisher's *The Genetical Theory of Natural Selection*. The writing was dense and filled with complex mathematical formulas, and the time and effort it took Hamilton to fully

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[251] While in England, his house was a nice four-mile walk from Darwin's Down House. His mother, Bettina, often took him on these walks, and they would discuss evolution along the way. Hamilton recalls, "I never looked back. I was certain that (natural selection) was the key to unlock a wide variety of those patterns in nature that fascinated me." Quote found in Lee Ann Dugatkin's *Altruism Equation: Seven Scientists Search for the Origins of Goodness* (Princeton: Princeton University Press, 2006), 87.

[252] Ullica Segerstrale, *Nature's Oracle: A Life of W.D. Hamilton* (Oxford: Oxford University Press, 2013), 44.

understand it caused his grades to drop significantly (Fisher was first and foremost a statistician, after all). Fisher's immediate hindrance to Hamilton's scholastic achievement, however, would pay dividends in the long run, for Hamilton now had a theoretical framework in which to operate: evolution at the gene level. Part of the reason he loved the book was its similarity to the gene-centered readings from his childhood (Hamilton called them "echoes of my old opinions, which I never really abandoned"), but it was much more than a simple affirmation of existing beliefs that caused him to declare *The Genetical Theory of Natural Selection* his "grail".[253] Fisher had given him the tools to continue his learning and to make discoveries relevant to contemporary problems in evolutionary theory.

The faculty at Cambridge was almost universally supportive of group selection at this time. From their perspective, Fisher was no longer relevant to biology, so they focused on challenging David Lack's individual selection theories in their lectures.[254] By emphasizing altruistic behavior in social species, they hoped to convince their students of the limitations inherent in theories based on individual self-interest. Sir Vincent Wigglesworth, for example, taught, "Insects do not live for themselves alone. Their lives are devoted to the survival of the species whose representatives they are…We must now stand back and look at the insect as a member of the 'population' or 'species' to which it

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[253] Segerstrale, *Nature's Oracle,* 46.

[254] Hamilton recalled, "(Fisher's) writings on evolution I had to discover for myself because they appeared to be either unknown to or disapproved of by my lecturers. One told me that Fisher's work on statistics was admittedly very important but Fisher had no credentials even to be writing on biology." W.D. Hamilton, *Narrow Roads of Gene Land: The Collected Papers of W.D. Hamilton,* Vol. 1 (New York: Spektrum Academic Publishers, 1998), 21.

belongs. Indeed we have now reached the heart of the matter—the aim and purpose (so far as we can understand them) of the life of the insects."[255] Hamilton called this "the Cambridge view of evolution" and he credits his anathema to it as the stimulus for his earliest academic papers.[256] Regardless of their authority as professors, Hamilton just could not accept their argument because "Fisher in the second edition of The *Genetical Theory of Natural Selection* (1958) rejects almost all explanations based on the 'the benefit of the species."[257]

Yet, how does one explain altruism, which surely exists, if not by group selection? Hamilton himself recognized this was a thorny issue. In "The Evolution of Altruistic Behavior," he acknowledged the blind spot in Fisher's evolutionary lens: "The kinds of behavior which can be adequately explained by the classical mathematical theory of natural selection are limited. In particular this theory cannot account for any case where an animal behaves in such a way to promote the advantages of other members of the species not its direct descendants at the expense of its own."[258] Of course, one solution to the problem of altruism was group selection. In fact, altruism ceases to be a problem at all if one accepts the popular explanation that natural selection favors "the

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[255] Hamilton, *Narrow Roads of Gene Land*, 22.

[256] To quote Hamilton, he credited the stimulus to the development of his kinship theories to "my lecturers largely endorsing a 'benefit of the species' interpretation that stood in sharp contrast to the writings of my then hero of twentieth-century evolutionary theory, R.A. Fisher." Hamilton, *Narrow Roads of Gene Land*, 21.

[257] William Hamilton, "The Evolution of Altruistic Behavior," *The American Naturalist* 97 (1963): 355.

[258] William Hamilton, "The Evolution of Altruistic Behavior," *The American Naturalist,* Vol. 97 (1963), 356.

most stable and cooperative groups," which explains why so many biologists supported Wynne-Edwards. Hamilton, however, was convinced they were on the wrong tack. Despite the fact that traditional natural selection allowed "no possibility of the evolution of any characteristics…to the disadvantage of the individuals possessing them," Fisher and Haldane had hinted at the possibility of a gene-level explanation of altruism, and Hamilton was determined to deduce exactly what that explanation was.[259]

Haldane suspected his contributions to population genetics had implications for the understanding of self-sacrifice. For example, he was known for exclaiming (drunkenly, the stories go), "I would lay down my life for two brothers or eight cousins!" Likewise, Fisher, when contemplating why some insect larvae were noxious, concluded that this particular adaptation, while providing no benefit to the individual larva being eaten, "increased protection (to the) brothers and sisters of the attacked."[260] Somewhat inexplicably, however, neither Haldane nor Fisher developed mathematical models to support their ruminations on altruism—although they specialized in quantitative analysis! The best explanation for their inattention to such an important concept is to remember that Haldane and Fisher were primarily statisticians, not naturalists; they never spent time observing animals in nature, as many of their peers in biology did as a matter of course. Therefore, when they theorized about evolution, they focused on probabilities of genetic mutations and rarely thought about the actual behavior of animals. Hamilton, like any ambitious graduate student, saw this gap in the scholarship as an opportunity, for he knew

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[259] William Hamilton, The Genetical Evolution of Social Behaviour," *Journal of Theoretical Biology* 7 (1964): 1-16.

[260] Fisher, *Genetical Theory of Natural Selection*, 159.

that "the behavior characteristic of a species is just as much the product of evolution as the morphology," and as such required sufficient explanation.[261]

After deciding to investigate the "problem" of altruism, Hamilton then had to decide how to proceed. No one had systematically studied altruism from a genetic perspective before, so there was no clear precedent to follow, which was both exciting and terrifying to the young scholar. Aware that human beings were a species that engaged in altruistic behavior, he decided to contact the anthropology department at Cambridge to see what they could teach him about human nature and altruism. Big mistake. The head of the department, Edmund Leach, like almost anthropologists at the time, "believed that all human behavior was culturally derived and that genetics had no bearing on the behavior of our species."[262] When Leach realized what Hamilton was up to, he became unreceptive, if not hostile to the young man. The genetics department at Cambridge also opposed Hamilton's proposal to blend genetics with anthropology, so they counseled Hamilton, "You have to realize that those people over there won't teach you science…social anthropology is done more like poetry."[263] Lacking support from the establishment, Hamilton feared he might be "a crank." "How could it be," he wondered, "that respected academics around me, and many manifestly clever contemporary graduate students I talked to, would not see the interest in studying altruism along my lines unless it were true that my enterprise were bogus in some way obvious to all of them but no

[261] Hamilton, "The Evolution of Altruistic Behavior," 354.

[262] Dugatkin, *The Altruism Equation,* 91.

[263] Hamilton, *Narrow Roads of Gene Land*, 23.

me?"[264]

With no guidance for his project, Hamilton began constructing mathematical models on his own depicting the conditions in which altruistic behavior among relatives made sense from a genetic perspective. To do so, he first had to learn theoretical population genetics, which "often drove (him) to despair" because, according to him, "I had little talent in mathematics and even less training for it, so my efforts…were tedious in the extreme."[265] During this difficult time, he discovered Sewall Wright's "The Biometric Relation between Parent and Offspring," and he realized that he had found his answer. Wright had constructed a simple, mathematical way to visualize the degree of relatedness between individuals using what he called the "coefficient of relationship," denoted as *r*. To understand his concept, imagine a mother and son. The son shares half his genes with his mom, so for them $r = .5$. When that son has a child of his own, the baby and grandmother, who share a quarter of their genes, have an *r* of .25. From these rudimentary examples, Wright deduced his general formula for people of direct ancestry, $r = .5^n$, where *n* is the number of generations that separate them. Hamilton, building off the logic of this formula, then derived "Hamilton's Rule" for altruistic behavior, which is $r \times b > c$. Here, the variable *r* is the same, while *c* is the cost of altruism and *b* is the benefits accrued by blood relatives of the altruists. In other words, altruism is evolutionarily logical when the person needing help is more closely related to the person doing the helping.[266] For the modern reader, this may seem like common sense, and,

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[264] Ibid., 25.

[265] Ibid., 25.

[266] Think of a parent's willingness to sacrifice themselves for their child. That

indeed, Hamilton feared that the critical reception to his work might be along the lines of "True; but, of course, all fairly obvious."[267] By presenting a mathematical formula to explain altruism without group selection, however, Hamilton had accomplished something significant.[268] He had answered the last, major remaining question left unanswered by the modern synthesis, "At what level does evolution operate?" He had also, somewhat unintentionally, re-opened the door for speculation about human affairs from an evolutionary perspective, at least within the hard sciences.[269]

Success did not come without struggle for Hamilton. From his earliest days as a graduate student he sensed "that there existed a prejudice against my topic."[270] Before the second world war, Francis Galton, a pioneering eugenicist, had established the genetics department where Hamilton was earning his degree; however, ever since the

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same person, probably, would also be willing to help their cousin, but might be less willing to lose their life doing so. A decision to sacrifice oneself to help a stranger likely entails even more ambivalence.

[267] Hamilton, *Narrow Roads of Gene Land,* 29.

[268] In subsequent works he would apply his formulae to an order of insects called Hymenoptera. These insects practice extreme altruism in the form of asexual drones. His findings confirmed the importance of genetic relatedness for altruism, effectively convincing most biologists of gene rather than group selection.

[269] It is important to note that Hamilton did not see himself as a strict advocate of gene-selectionism. In fact, his talks with George Price convinced him that his theories explicitly acknowledged evolution operating at different levels, albeit to different strengths. Nonetheless, a scientist, much like an artist or anyone else who puts their work into the public, is not in control of how their work is viewed, and he is largely considered to be the man who established the gene as the level of selection.

[270] Hamilton, *Narrow Roads of Gene Land*, 3.

war the current director, Lionel Penrose, had been desperately trying to remove any hint of eugenics from the department. For example, he changed the name of the journal from the *Annals of Eugenics* to the *Annals of Human Genetics*. Therefore, when Hamilton approached Penrose about the prospect of studying the role of genetics in altruism, "Penrose emphatically told (him) no and that he doubted there was such a problem to be studied (presumably because altruism could be explained by cultural conditioning)."[271] Hamilton was convinced that Penrose "saw me in the eugenical spectre" and as a result, despite working at genetics department for two years, Hamilton "never had a desk there nor was ever invited to give any presentation to explain my work."[272] Eventually, when the time came to renew Hamilton's funding, the genetics department refused, leaving him to continue researching his project alone.

During this "dark time," the London School of Economics (LSE) mercifully decided to award Hamilton a grant, and for the first time he began to feel supported.[273] In *The Narrow Roads of Gene Land*, he fondly recalls how Norman Carrier, a human demographer at LSE "listened to my confused ideas with an unfamiliar sympathy, speaking as though quite unaware of even a possibility that I might be a sinister new sucker budding from the roots of the recently felled tree of fascism."[274] It appears that Hamilton, a shy, young man, needed no more than a lack of active hostility to feel relief from his long struggle. Additional encouragement came when he discovered the work of

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[271] Ibid., 14.

[272] Ibid., 11.

[273] Ibid., 3.

[274] Ibid., 4.

George Williams, an American biologist who was also studying genes and altruism.[275] Finally, Hamilton could confide in someone who understood both the theoretical and social challenges he faced. In a letter to Williams he gushed, "The discovery of your work has been a considerable encouragement to me. My own has been carried out in the face of widespread skepticism and even contempt, making me doubt at times whether my approach to these problems could really be as fundamental and as correct as it seemed to me."[276] Buoyed by a new academic environment and new friendships, Hamilton came to see his earlier difficulties as the result of irrational attachment to "almost essential human myths."[277] Although he did not see them this way, he understood that others believed his papers to be "solvents of vital societal glue."[278]

Hamilton himself never believed kin selection, the term he gave for gene-maximizing altruism, to be a threat to Progressive values because he held a different view of history than the liberal academic establishment. As we have seen, many thoughtful people, including most academics, blamed the holocaust (which was an effort to "improve" the genetic makeup of Germany) on the influence of applied evolutionary thinking. Hamilton, like almost everyone else, was appalled by the horrors of fascism; however, he believed the root of the evil was not the scientist Charles Darwin but rather the revolutionary Karl Marx, who had "recast (evolution) into terms of his own

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[275] A zeitgeist of genetic altruism?

[276] William Hamilton letter to George Williams, as quoted in Ullica Segerstrale, *Nature's Oracle*, 71.

[277] Ibid., 15.

[278] Ibid., 15.

preoccupation with group struggles."[279] Hamilton knew that evolutionary success depended on genetic diversity, not conformity, and as someone intimately familiar with the subtleties of Darwin's work, he was sure Darwin would have agreed.[280] For this reason, "it hardly crossed (his) mind that Galton and Darwin were considered by many to have laid the intellectual foundation for Nazi racial crimes" when he first set out to establish a Darwinian explanation for altruism.[281] Ironically, in fact, one of the reasons Hamilton was so determined to attack group selection theory was his disdain for the collectivist rhetoric of the Axis powers.

This is not to say that Hamilton's critics were entirely wrong about him. He admitted, "As an avowed adversary of eugenics, Penrose may really have had good reasons to distrust me. When I first met him I was quite a strong believer in eugenics. More than most people I still am."[282] As far as he was concerned, there was no inherent racism, sexism, or large-scale discrimination of any sort in eugenics. In fact, he saw eugenics as positive concept, one he came to support as part of his "youthful wish to improve the world."[283] "I much liked the notion," he wrote, "that human-directed selection, whether to maintain standards or to speed the intellectual and physical progress of humanity, could be made both more effective and more merciful than the

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[279] Ibid., 16.

[280] According to Hamilton, the idea that "there could ever be a single ideal type of human being always seemed to unnatural—such a uniform ideal just never looked like Nature's way." Ibid., 16.

[281] Ibid., 15.

[282] Ibid., 15.

[283] Ibid., 15.

obviously inefficient and cruel natural process."[284] Clearly, Hamilton's theory of genetic altruism was touching on some very delicate political issues, such as the presence of a biological human nature and the question of whether individual liberty or collective support was best for democracy. And, while Hamilton himself may not have been concerned with the implications of his work, others were concerned that altruism had been reduced to self-serving actions among family members. Was true selflessness to be crushed by the logic of evolution?[285]

When it came to his own life, Hamilton wished for something *more*. He disliked "the idea that my own behaviour or behaviour of my friends illustrates my own theory of sociality. I like always to imagine that I and we are above all that."[286] He lamented, "I have to admit that at the time the thoughts were painful to me," because general compassion was "a plane of perfection to which all civilized cultures are thought to be striving."[287] Yet, he refused to succumb to negativity. It might be easier to say one's genes have no role in behavior or that group selection would better facilitate cooperation, but those ideas were wrong and he "continue(d) to believe that only from a basis of honest description can there be hope of taming what we have an may not like."[288] To set a

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[284] Ibid., 15.

[285] One of Hamilton's close friends, George Price, agonized over the apparent selfishness at the root of altruistic behavior. In despair, he turned to God and began providing shelter for the homeless. He eventually killed himself due to the Machiavellian implications of kin selectionism. Oren Harman, *The Price of Altruism: George Price and the Search for the Origins of Kindness* (New York: W.W Norton & Company, 2010).

[286] Williams, *Narrow Roads of Gene Land*, 2.

[287] Ibid., 189.

[288] Ibid,, 189.

personal example he attempted to transcend gene-based altruism by adopting two children and providing them with unconditional love. It would not be easy, but there was a way to create a better world.

The "hard truth," it appeared, was that animals, including human beings, were predisposed to help others, but only to the extent that it benefits their own genes. To test this theory, biologists the world over began researching altruism in nature, and their findings confirmed Hamilton's uninspiring insight. For example, researchers found that the cannibalistic spadefoot toad can "taste" relatedness, and will spit out the tadpoles of its relatives, but not others.[289] Of course, there are countless instances of kindness toward non-kin; however, Hamilton believed, these could be explained by the self-serving logic of Adam Smith and did not warrant biological analysis. From Smith's perspective, "It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest…nobody but the beggar chooses to depend chiefly on the benevolence of his fellow citizens."[290] Then, at a party hosted by theoretical biologist Mary Jane West-Eberhard (who would later gain fame for her remarkable insights on the phenotype plasticity), Hamilton met a graduate student named Robert Trivers, and the young man "changed (his) dismissive attitude" about nongenetic

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[289] Harman, *Price of Altruism*, 313.

[290] Adam Smith, *An Inquiry into the Nature and the Causes of the Wealth of Nations,* Vol. 1, eds. R.H. Campbell and A.S. Skinner (Indianapolis: Liberty Fund, 1981), 26-27.

altruism.[291]

Trivers did this by introducing Hamilton to his concept of "reciprocal altruism," which provides the evolutionary logic for cooperative networks beyond kinship ties. Reciprocal altruism is a fairly straightforward idea, and it builds off the gene-maximization logic Hamilton introduced. Before discussing the nuances of Trivers' theory and the tremendous social implications it held, however, it is worthwhile taking a look at how he found himself lecturing Hamilton, who by this time was a widely respected theoretician, while drinking beer in someone's backyard.

Trivers was brilliant, which might be typical for Harvard graduate students, but his path to eminence within biological circles (Stephen Pinker called him "one of the great thinkers in the history of Western thought") was anything but. A schizophrenic, white member of the Black Panther party, he certainly did not fit the mold of an aspiring scientist. In fact, he initially wanted to be a lawyer. After graduating college he said to himself, "All right, I'll become a lawyer and fight for civil rights and against poverty! Someone suggested that I take up U.S. history, but you know at that time, in the early 1960s, their books were entirely self-congratulatory. I ended up in biology."[292] This apparently rash decision took its toll on the sensitive young man. The new material caused him tremendous anxiety, and he fell into fits of mania, staying up for days at a time reading Wittgenstein before collapsing on the floor. Other mental breakdowns

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[291] Hamilton, *Narrow Roads of Gene Land*, 262-263.

[292] Initially he intended to study monkeys but his adviser was a herpetologist, so he found himself in Jamaica studying lizards. In the end, this wasn't so bad. "When I flew to Jamaica I took one look at the women and one look at the island and decided to become a lizard man if that's what it took to go back there." Harman, *The Price of Altruism*, 273.

followed that were "so painful that I had resolved that if I ever felt another one coming on, I would kill myself."[293]

His first graduate paper was actually on theoretical ecology. It was a critique of the Harvard biologist Richard Levins' work; however, when Levins' close friend, famed population geneticist Richard Lewontin, bullied him at a conference, he decided to change course.[294] According to Trivers, Lewontin had been "arrogant and condescending" toward him, which naturally made Trivers want to defend his position, yet he recognized that to do so effectively would require a tremendous amount of time and effort.[295] "To make progress in this area you needed mathematical skills and discipline that I was not about to develop, and you would also greatly benefit greatly from twenty or thirty years of running around in the woods. That is, if you could combine intuition and real knowledge of nature with the kind of mathematics required to handle complex interactions, then perhaps you could make some headway."[296] Further, he recognized that his paper, although accurate, was entirely negative—"I had, at best, only a bag full of *their* errors."[297] He wanted to commit to something constructive, so he asked himself "What positive thought (do) I have?" and he immediately thought of

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[293] Robert Trivers, quoted in *The Price of Altruism*, 273.

[294] Trivers' paper went "viral" before the internet made that commonplace. He accomplished this when a fellow student photocopied his paper and took it to a conference on another continent, from where it was copied again and again.

[295] Robert Trivers, *Natural Selection and Social Theory: Selected Papers of Robert Trivers* (Oxford: Oxford University Press, 2002), 4.

[296] Ibid., 4.

[297] Ibid., 4.

friendship.[298]

"I came into biology at the age of twenty-two," he recalled, "never having had a course in biology and knowing next to nothing about animal behavior, my knowledge was almost entirely restricted to our own species. In adult humans it was obvious that, though kinship was a very important factor—blood being thicker than water—it could not explain all phenomena. We had strong positive feelings toward friends, and we were willing to act altruistically toward them and others. Kinship could not explain this. What could?"[299] Thus, "I saw that what in the human species was obviously a major area of life involving deep and complex behaviors not explained by Hamilton's theory, and required some new explanation."[300] The next step for Trivers was to find examples in nature that supported his theory, which he did in the least likely of places, a book titled *The Biology of the Mouth*. Apparently, the endlessly curious Trivers saw an advertisement for the book and thought to himself, "Who wouldn't want to understand the biology of the mouth?"[301] And while reading the mostly disappointing articles (they focused mostly on dentistry), he came across a chapter on fish symbiosis in the ocean. Eureka. In the following months Trivers gathered evidence that host fishes give a warning to their parasite-eating companions when a predator is near. These fish had demonstrated "concern for the life of the cleaner, even at some cost to (their) own life," and because

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[298] Ibid., 5.

[299] Ibid., 7.

[300] Ibid., 7.

[301] Ibid., 8.

they were different species, kinship could be ruled out.[302]

Trivers was thrilled. For years evolution had been associated with unbridled, often violent competition, and, although Hamilton's work had changed the tone somewhat by demonstrating the evolutionary logic of personal sacrifice, the boundary of goodwill appeared to lie just outside a family's front door. Trivers knew well the history of applied evolutionary thinking, and he hoped his theory could reverse the perceived social implications: "For me, emotionally, to see that just pursuing this scratch-my-back argument would generate rather quickly a reason for justice and fairness was very gratifying because it was on the other side of the fence of that awful tradition in biology of the right of the strongest."[303] No longer would people perceive fairness as "some arbitrary cultural construct or an easily changed effect of socialization."[304] Reciprocal altruism, instead, suggested "that there were deep biological roots to our sense of fairness that to me would seem to encourage a commitment to fairness or justice."[305]

In order to convince the majority of biologists, however, Trivers had to do more than provide a few examples from nature that appeared to support his theory. He had to provide a model to ground his theory in the cold logic of mathematics. When his friend and mentor, the accomplished entomologist E.O. Wilson, encouraged him to imitate Hamilton's convincing use of math, Trivers responded petulantly. He did not want to

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[302] Ibid., 8.

[303] Frans de Waal, *Good Natured: The Origins of Right and Wrong in Humans and Other Animals (*Boston: Harvard University Press, 2009), 25.

[304] Trivers, *Natural Selection and Social Theory*, 17.

[305] Ibid., 17.

engage in the tedium of mathematics, and, besides, he thought reciprocal altruism was less amenable to quantitative methods than kin selection due to the increased number of variables. Fortunately, Hamilton and the political scientist Robert Axelrod did not suffer from the same "lack of imagination" (this was E.O. Wilson's criticism of Trivers when he said it was not possible), and in 1981, they constructed the mathematical model to support reciprocal altruism in "The Evolution of Cooperation."[306] When Trivers, who was by then a professor at the University of California, received a copy, he "sat down at around eight o' clock at night, turned on some classical music, read the paper, and…my heart soared…To me the paper had almost biblical proportions, That is, you could see how a kind of social heaven…could evolve right here on earth."[307]

[306] In essence, their paper proved that reciprocity in the context of iterated encounters is a Nash equilibrium, meaning that it is evolutionarily stable. (Many readers will know Nash as the protagonist in the film *A Beautiful Mind.*)

[307] Trivers, *Natural Selection and Social Theory,* 53.

SOCIOBIOLOGY

Trivers was not alone in his enthusiasm. Even as he sat silently in his study, basking in the glow of reciprocal altruism's profoundly optimistic implications, rumblings of great change grew loud just outside his door. By providing evolutionarily logical explanations for altruism among relatives and friends, he and Hamilton had laid the groundwork for innumerable studies into animal behavior, and the scientific community at-large rushed to stake their claims in the newly charted territory. Foremost among these men and women was the American entomologist E.O. Wilson, whom the reader first met in the introduction. Back then Wilson was in the unfortunate predicament of having angry activists pour water over his head, chanting that he was a racist who "could not hide." Now that the historical context has been set, we can return to that moment in time and properly introduce the man, to situate him as an important popularizer of Hamilton and Trivers' work, and to gain an understanding of the role he played in the return of evolutionary thinking in the social sciences.

Born in Birmingham, Alabama in 1929, Edward Osborne (E.O.) Wilson spent countless hours as a child exploring in the forests and along the ocean shores. His parents fought frequently, eventually divorcing in 1936 despite a strong taboo against doing so during that era, so perhaps he used this time to escape the tension at home. In his autobiography, Wilson recalls how he enjoyed being outside and discovering "monsters" (his terms for spectacular new animals) because they allowed him to imagine he was in a

different world.[308] One such discovery, of a jellyfish, or "scyphozoa," left a lasting impression on the young boy. The bizarre features of the animal, so different from a human's, filled him with wonder for unique ways of being and thinking, and he carried this perspective with him throughout his life.[309] Wilson, however, did not experience the same support for intellectual development as Hamilton had while growing up, so an academic career was not likely. Instead of trips to museums and homemade science experiments, his parents raised him according to the traditional values of the South: discipline, physical courage, and Christian piety.[310] When he was sent to a military academy at the age of eleven, the expectation was that he would develop the fortitude necessary to become an officer in the United States military. He likely would have done so, too, but a fishing accident damaged the sight in his right eye, causing the army to reject his application. Serendipitously, this physical limitation allowed him to pursue his intellectual dreams, and before long the child who loved animals had become a professor of biology at Harvard University.

In 1956, the very year he earned his doctorate, Wilson was asked to chair the PhD committee for a graduate student named Stuart Altman. Academic departments typically wait a few years before asking their new professors to take on such a

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[308] E.O. Wilson, *Naturalist* (Washington D.C.: Island Press, 2006), 9.

[309] This perspective is noteworthy in that academia tends to support intellectual investigation at the margins of accepted doctrines rather than truly novel discoveries. Thus, providing a new insight that adds complexity to an established perspective is accepted more readily, and seen as more "academic," than a new perspective entirely. This tension is often linked to the scale of the narrative, with narrower projects granted more credibility than larger ones. E.O. Wilson's penchant for unique, big-picture thinking caused conflict with colleagues who felt that was "bad science."

[310] Wilson, *Naturalist*, 36.

responsibility because they already have quite a bit on their plate, but in this case none of the other faculty felt adequately prepared to mentor Altman. The reason for their collective hesitation was the nature of the project—he wanted to study the behavior of wild rhesus monkeys on a small island off the coast of Puerto Rico—and Wilson's colleagues had never studied primates out of captivity. Some members questioned whether the project was even sufficiently academic (Remember, this is years before Jane Goodall's groundbreaking research in the Gombe Reserve). Wilson, however, eagerly took on the project.

During the course of the field research Wilson became convinced that animal behavior was as intrinsic to a species as its physical characteristics. He and Altman, one a specialist in ants and one in primates, often talked late into the Caribbean night about the possibility of a unifying theory for all social animals. Other zoologists such as Walter Clyde Allee had provided descriptive accounts of animal behavior before, but Wilson and Altman wanted to do more than describe; they wanted to explain *why* animals behaved as they did. The name for their theory: "sociobiology."[311] Unfortunately, however, the two men had to shelve the project despite their enthusiasm, for they came to recognize that they lacked the conceptual tools to advance the work of their predecessors.

Even as he continued to focus on entomology, Wilson kept his pet theory in the back of his mind. Over the coming years he saw potential in different sources but they each had their limitations. His first hope came from population biology, which he saw as

[311] Unfortunately, the word "sociobiology" is quite similar to "soziobiologie," the word used in Nazi Germany to justify their efforts to manage selection to benefit the Aryan race. This similarity would later facilitate claims that Wilson was advocating an outdated and racist scientific perspective.

"a possible foundation for sociobiology."[312] He theorized that caste systems among social insects resulted from a population-level regulation of the birth rates of individuals with different phenotypes.[313] Here Wilson is clearly under the influence of Wynne-Edwards' group selectionist arguments. This is not surprising due to the tremendous popularity of *Animal Dispersion in Relation to Social Behavior* at the time, yet for Wilson—and most of the biological community—group selectionism proved to be a dead end. Next, Wilson looked to ethology. Konrad Lorenz and Nikolaas Tinbergen, the modern-day founders of the discipline, were achieving great success studying animal behavior (they would share the Nobel Prize in 1973), and their work seemed to be a natural source of inspiration. Wilson, however, found their theoretical model to be lacking, as it was too mechanical and relied too much upon input from external cues. What he needed was a theory to explain the internal, subconscious motivation behind animal behavior.

In 1965, Wilson took a long train ride from Boston to Miami, and as a matter of course he brought along several books and articles to read, one of which happened to be Hamilton's paper on kin selection. Wilson was not expecting much from the British graduate student, so he "riffled through it impatiently."[314] He was anxious to get the gist of the argument and return to what he intended to be his primary reading material, but it didn't work out that way. Wilson's recollection of the experience is worth quoting at length:

Impossible, I thought; this can't be right. Too simple. He must not know

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[312] Wilson, *Naturalist*, 312.

[313] Ibid., 312.

[314] Ibid., 319.

> much about social insects. But the idea kept gnawing at me early that afternoon. As we departed southward across the New Jersey marshes, I went through the article again, more carefully this time, looking for the fatal flaw I believed must be there...Hamilton, whoever he was, could not have cut the Gordian knot...And because I modestly thought of myself as the world authority on social insects, I also thought it unlikely that anyone else could explain their origin, certainly not in one clean stroke. The next morning, as we rolled on past Waycross and Jacksonville, I thrashed about some more. By the time we reached Miami, in the early afternoon, I gave up. I was a convert, and out myself in Hamilton's hands.[315]

Much like Darwin a century before, Wilson had found his "theory by which to work." Thanks to Hamilton, he had an opportunity to transform his dream of sociobiology into reality. Fueled by the "amphetamine of ambition," Wilson set out to establish sociobiology as a new discipline, one grounded in the theory of kin selectionism.[316] His first effort, *Insect Societies*, was a sociobiological analysis of, well, insects, yet he had far grander plans. In the final paragraph he writes, "The optimistic prospect for sociobiology can be summarized briefly as follows. In spite of the phylogenetic remoteness of vertebrates and insects and the basic distinction between their respective personal and impersonal systems of communication, these two groups of animals have evolved social behaviors that are similar in degree of complexity in many important details. This fact conveys as special promise that sociobiology can eventually be derived from the first principles of population and behavioral biology and developed into a single, mature science." [317]

Wilson then spent the next two years writing *Sociobiology: The New Synthesis.*

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[315] Ibid., 320.

[316] Ibid., 323.

[317] Ibid., 322.

The workload was incredible, as he could not neglect his teaching responsibilities at Harvard nor his ongoing research in ant biology, but he was committed to making a mark in the scientific community and was willing to put in the long hours. He did not have any illusions about the nature of the project. *Sociobiology* did not propose a new theory; that recognition would go where it belonged, to Hamilton. Yet he saw two paths to success, "breakthroughs for the extremely bright, syntheses for the driven," and, "knowing where (his) capabilities lay," he was comfortable with the latter.[318] During this time Wilson had the incredible luck to serve on the PhD committee for precisely the person who could most help his project, Robert Trivers.[319] Trivers, of course, enabled Wilson to expand his synthesis much further, as reciprocal altruism explained cooperation among friends in addition to kin. The resulting book was a tome of erudition, encyclopedic in depth and, for those unfamiliar with the work of Hamilton and Trivers, a shocking new perspective. Wilson achieved widespread acclaim upon its publication. In 1977, President Carter awarded Wilson the National Medal of Science and, later that year, *Time* magazine placed *Sociobiology* on the cover.

So, you might be wondering, how did any of this land Wilson on the wet end of a water bucket protest against racism? Well, the book's success was only half the story. Behind the praise lurked vehement opposition, for Wilson's ambition had taken him to the heart of taboo thinking: an evolutionary analysis of human beings. To Wilson, it was only natural to include human beings in a work purporting to cover the entire animal

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[318] Ibid., 323.

[319] Although an established scientist by then, Wilson remembers that "two or three hours with Trivers left him exhausted for the day" due to the effort required to keep up with the younger man's brilliant speculations.

kingdom. Humans are animals, are they not? And to understand them it makes sense to take into account the vast majority of their existence. "History," he explained, "did not begin 10,000 years ago in the villages of Anatolia and Jordan. It spans the 2 million years of the life of the genus Homo. Deep history—by which I mean biological history—made us what we are, no less than culture."[320] By including humans in *Sociobiology*, however, he had, somewhat naively, he later admitted, threatened those who believed that intellectuals in the first half of the twentieth-century had demonstrated how fallacious—and dangerous—evolutionary thinking was when applied to human beings.

What remained to be seen at this point was whether or not the taboo would hold, for it was certainly possible that the popularity of *Sociobiology* could cause reasonable people to again consider human beings' evolutionary heritage when contemplating their contemporary condition. The opponents of sociobiology (a diverse group, but primarily Marxists and "radical" feminists) saw the new theory as a disingenuous effort to justify a hierarchical world order benefitting those in power. Sociobiologists, they claimed, were exploiting the authority of science to revive prior claims that white male privilege was somehow "natural" and thus resistant to change.[321] Wilson's response to the attacks was to claim that it was all a misunderstanding, that the protestors were conflating sociobiology, which was inspired, after all, by Hamilton and Trivers' insights into the evolutionary logic of cooperation and self-sacrifice, with the discriminatory evolutionary theories of the past. Sociobiology was not eugenics. It was not scientific racism. And it

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[320] Ibid., 328.

[321] Elizabeth Allen, Barbara Beckwith, John Beckwith, Steven Chorover, David Culver, et al., "Against Sociobiology," *New York Review of Books*, November 13, 1974.

certainly was not an apology for the holocaust. Which brings us back to February of 1978, with a bucket of water—and the legacy of sociobiology—hanging in air. At the time, of course, no one knew with certainty what the future of the new discipline held. Now, looking back, it is possible to discern whether it engendered a paradigm shift in the American intellectual community by revealing the genetic influence on human behavior or whether the activists were able to douse the flame of discriminatory science.

My argument is that sociobiology did usher in a new era of evolutionary analyses of human beings. It is not enough, however, to simply claim that the new discipline had a tremendous impact on the social sciences; an observant person could induce that fact after a careful reading of the trends in the popular and academic press during the last forty years. The goal of the current chapter is to demonstrate *why* sociobiology was successful.[322] Why were social scientists, who had almost unanimously rejected evolutionary thinking in the 1950s, now willing to entertain these notions again? The decision to do so could not have been made lightly, as a strong institutional commitment to strictly cultural explanations for human behavior had existed since the United Nations Education, Scientific and Cultural Organization (UNESCO) Statement on Race in 1950 admonished efforts to craft policy from biological principles.

To successfully reintroduce biological thinking in the social sciences the sociobiologists would have to, at the very least, convincingly respond to the early twentieth-century critiques of Social Darwinism and eugenics. The reader will recall that in the early 1900s an entire generation of intellectuals framed their arguments in

[322] Paraphrasing the great German philosopher Arthur Schopenhauer, "The task is not so much to see what no one has yet seen, but to think what nobody has yet thought."

evolutionary terms until a series of challenges to this way of thinking led to its decline and, ultimately, disavowal. The philosophers Henry Sidgwick and G.E. Moore led the way in this effort by challenging the logic of applying biology to human affairs. Specifically, Sidgwick, who was inspired by the logic of the great David Hume, claimed that evolutionary ethics (philosophy's focal interest in evolution) violated the "is/ought" fallacy; in other words, it mistakenly presupposed that what exists is the best possible outcome. In the search for lasting, meaningful ethical standards, Sidgwick insisted, one should not accept the world as Panglossian optimists, but should critically assess, probing for weaknesses.[323] Later, Sidgwick's student G.E. Moore joined in the assault, arguing that what is good for society can't possibly be elucidated through scientific inquiry because the concept of "good" is irreducible. Thus, evolutionary ethics suffered from a violation of the "naturalistic" fallacy.[324]

Despite the increasingly narrow scope of philosophical inquiry throughout the course of the nineteenth and twentieth centuries, academia has continued to respect philosophy's authority; thus, Sidgwick and Moore's critiques of evolutionary ethics stood as a formidable obstacle to sociobiology's acceptance among social scientists. The

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[323] Pangloss is a satirical representative of the optimistic theodicy of Gottfried Wilhem Liebniz character in Voltaire's *Candide*. Liebniz believed that life on earth was as good as it could possibly be because God was benevolent and all-powerful. Voltaire found this amusing.

[324] The term "naturalistic" is somewhat misleading here. One reasonably expects the fallacy to refer to the mistaken supposition that what is found in nature is not necessarily good. That assumption is made greater still due to the similar logic found in Sidgwick's reference to the "is/ought" fallacy. As is philosophy's wont, however, the simplest explanation will not do in this case, as "naturalistic" refers to a seemingly Platonic concept of intrinsic identity, e.g., the "chairness" of a chair which remains inviolable and absolute.

sociobiologists, however, managed to repel the philosophical attack by simply agreeing. "Of course," they responded, "what one finds in nature does not represent humanity's highest ideals. It is impossible to take such a notion seriously when aware of the wanton violence throughout the animal kingdom." Michael Ruse, the first philosopher to embrace sociobiology, reassured those who feared a philosophical justification for the "survival of the fittest" by acknowledging, "it is still legitimate and proper to make the distinction between 'is' and 'ought'."[325] E.O. Wilson later ruffled feathers with his call to "biologize" ethics, but even he admitted "there is a dangerous trap in sociobiology, one which can be avoided only by constant vigilance. The trap is the naturalistic fallacy of ethics."[326] Although these mitigating claims did serve as effective responses to philosophical concerns, it would be cynical to see them as calculated conciliation; these men believed, like Thomas Huxley before them, that an accurate understanding of evolution was necessary for resistance, not emulation.

Another major challenge to the previous application of evolutionary thinking was the conflict between biometricians and Mendelians (not to mention the substantial factions of scientists who favored orthogenesis or some variant of Neo-Lamarckism). With no consensus on how evolution occurred it was impossible for responsible intellectuals to justify incorporating the insights of evolution into their analyses of human beings. Which evolutionary theory would they base their argument on, and what would they do if that theory eventually became discredited by its competitors? Fortunately for

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[325] Michael Ruse, *Sociobiology: Sense or Nonsense?* (Dordrecht: Reidel, 1979), 84.

[326] E.O. Wilson, *In Search of Nature* (Washington: Island Press, 1996), 93.

sociobiologists, the modern synthesis had repaired the schisms that previously fractured the discipline and undermined its authority. This is not to say that there were no important disagreements between evolutionary biologists, but by the 1960s these disagreements took place within the context of a broadly shared understanding of the major tenets of evolution. "All participants agreed that a consensus concerning the mechanism of evolution appeared among biologists during the 1920-1950 period," concluded William Provine after bringing together the world's leading evolutionary biologists for *The Evolutionary Synthesis: Perspectives on the Unification of Biology.*[327] With recourse to a unified core of evolutionary principles, sociobiology, while controversial, benefitted from far greater scientific legitimacy than its precursors.

Perhaps the most devastating critique of incorporating evolutionary theory into human affairs was the claim that it had led to prejudicial treatment of large numbers of people based upon their gender, ethnicity, or skin color. Eugenics, the well intentioned yet short-sighted and cruel policy of managing birth rates among the population, was certainly inspired by the notion that society needed to artificially replicate natural selection in order to "evolve." Due to the existence of welfare in modern Western nations, the thinking went, lazy and incompetent people avoided the ruthless justice found in nature and, in the long run, this would result in an "inferior" population. Thus, eugenicists sought to minimize the birthrates among the supposedly dull and weak while simultaneously encouraging reproduction among the "best" people. And while this might seem like a bad science-fiction novel to the modern reader, it was very influential thinking in the early twentieth-century, ultimately leading to the sterilization of over sixty

[327] Mayr and Provine, *The Evolutionary Synthesis*, 399.

thousand people in the United States alone.

Eugenics was only one of the regretful applications of evolutionary thinking in human affairs at this time.[328] Throughout the turn of the century advocates of white supremacy used "scientific racism" to justify discrimination against all sorts of people.[329] For instance, Italians and other immigrants from the south or east of Europe suffered from claims of intrinsic inferiority such as a purported propensity for crime. The leading expositor of scientific racism, Madison Grant, wanted to restrict immigration because he thought miscegenation would weaken the United States. "What the Melting Pot actually does in practice can be seen in Mexico," Grant argued, "where the absorption of the blood of the original Spanish conquerors by the native Indian population has produced the racial mixture which we call Mexican and which is now engaged in demonstrating its incapacity for self government."[330] Eventually, the Nazis took scientific racism to its gruesomely logical conclusion, and they attempted to cull members of the population seen as inferior, e.g., Jews, gypsies, and homosexuals. The holocaust became the

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[328] Biological inferences about human character, not necessarily derived from evolution, have a long history. In the early to mid-nineteenth-century phrenologists promulgated the belief that one's innate personal characteristics were reflected in the shape of the skull. Not surprisingly, both slave owners and abolitionists used phrenology to support their claims, as the former argued that black people were predisposed to subordination while the latter believed the skulls of black people indicated the need for protection, not enslavement.

[329] Some readers may want to dismiss scientific racism as pseudo-science, analogous to the infamous "snake oil" medicines of the nineteenth century. Supporters of scientific racism would retort that Darwin himself shared their beliefs. In *Descent of Man* he wrote, "At some future period, not very distant as measured by centuries, the civilised races of man will almost certainly exterminate and replace throughout the world the savage races." It is important to recognize that all science is value laden, as this allows us to remain appropriately skeptical, even of the science that supports our own worldviews.

[330] Grant, *The Great Race*, 17.

gruesome final chapter of applied evolutionary thinking in the first half of the twentieth-century, as decent people around the world officially declared that "mankind is one."[331] No less a global authority than UNESCO declared, although "the characteristics in which human groups differ from one another have often been exaggerated and used a as a basis for questioning the validity of equality in the ethical sense," it was now time to disregard these physical differences and focus exclusively on cultural variables.[332]

This would be a tough hill to climb for sociobiology, as the resulting taboo against evolutionary thinking in human affairs held strong moral undertones. To speak in in biological terms was, however implicitly, to defend white male supremacy—which of course almost no intellectuals wanted to do. So, how did sociobiology gain an opportunity to be heard with an open mind? Again, by agreeing! Sociobiology differentiated itself from the evolutionary thinking of the past by rejecting notions that there existed significant differences between people of different colors or genders. Instead, it emphasized the common humanity shared by all people around the world, just like the early to mid-twentieth-century critics had been saying all along. You can see how similarly social scientists and sociobiologists viewed the relationship between biology, race, and culture by juxtaposing UNESCO's official statement on the "biological aspects of the racial question" with an early sociobiologist's take on the subject.[333] Here is UNESCO:

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[331] UNESCO, 1950 Statement on Race, 1.

[332] Ibid., 4

[333] UNESCO, *Four Statements on the Race Question* (Paris: United Nations Educational, Scientific and Cultural Organization, 1969), 9.

> The genetic capacity for intellectual development depends on biological characteristics which are of universal value on account of their importance for the survival for the species in any natural and cultural environment... (Further), in the light of present knowledge, the differences in cultural achievements seem to be accounted for entirely by the cultural history of the peoples. This is in direct opposition to racist thought.[334]

And here is the sociologist Pierre van den Berghe: "By stressing how fundamentally alike humans are beneath their cultural differences…sociobiology could be a powerful antidote to racism."[335] Other than van den Berghe's brevity, the message is essentially the same.

The only critique of evolutionary thinking in human affairs that remained unanswered was the claim that the social sciences were distinct from the natural sciences and functioned most effectively with their own methodology. Perhaps there was no way to avoid conflict around this sensitive issue, as sociobiology, by definition, represented an incursion on previously autonomous disciplines; however, Edward Wilson and the sociobiologists certainly exacerbated the tension. There were no olive branches here, no mitigating statements limiting the reach of sociobiology. Instead, Wilson led a direct assault, arguing that "it may not be too much to say that sociology and the other social sciences, as well as the humanities, are the last branches of biology waiting to be included." Not everyone was as confident (or naïve, depending on your point of view) as Wilson. Anthropologist and sociobiologist Jerome Barkow counseled moderation. He recognized that "historically, Durkheim's principle helped protect the nascent social sciences from the racist pseudo-biology and pseudo-psychology of the time," and sought

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[334] Ibid., 15.

[335] Pierre van den Berghe, "Sociobiology, Dogma, and Ethics," *The Wilson Quarterly* 1, no. 4 (1977): 123.

to temper the resistance to sociobiology by advocating more realistic goals.[336] "Although Wilson ambitiously threatens that sociobiology is going to incorporate the social sciences, a more modest program would suggest that the paradigm of evolutionary biology is likely to be relevant to these disciplines," he argued in 1978.[337] Despite Barkow and others' restraint, the storm was on the horizon, for all sociobiologists believed that "evolutionary biology has profound implications for the social sciences."[338]

Despite their largely satisfactory answers to the questions surrounding applied evolutionary thinking, sociobiology's invasion of the social sciences would have failed if its sole advantage over previous evolutionary theories of human behavior was simply the accommodation of critics' complaints regarding ethics, race, and gender. Other people, primarily scientists, had been advocating the importance of biology in human affairs for years and they were unable to make any headway because more than compromise and intellectual persuasion was needed. What differentiated sociobiology was the fact that Hamilton and Trivers had established viable grounds for a biological social science. By demonstrating the evolutionary logic of sacrifice and cooperation they gave others the impression that evolution could account for the entire spectrum of human behavior—not just cruelty and competition. Further, the emphasis on the evolutionary logic of kindness allowed social scientists to once again speculate about human behavior through an

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[336] Jerome Barkow, *Missing the Revolution* (Oxford: Oxford University Press, 2006), 16.

[337] Jerome Barkow, "Culture and Sociobiology," *American Anthropologist* 80, no. 1 (1978): 6.

[338] Martin Daly, *Sex, Evolution, and Behavior* (Boston: Willard Grant Press, 1978), 343.

evolutionary lens without worrying that they would be associated with the ugliness of cutthroat competition, racism, sexism, or xenophobia.

The cruel governmental policies and discriminatory social attitudes of the early twentieth-century had repulsed social scientists, many of whom saw their disciplines as a vehicle for social progress. Consequently, social scientists recognized the taboo against evolutionary thinking in their disciplines as a necessary barrier to hateful ideas and not as a restriction of their intellectual liberty. Hamilton and Trivers, however, began to change the perception of evolution's implications for humans, which allowed some social scientists to question the taboo. A new possibility had arisen: one could now combine evolutionary analysis with progressive values.[339] Still, a powerful, institutionally backed taboo does not go away over night. In order for evolutionary thinking to return to the social sciences a small number of intellectuals had to have the temerity to take the first steps—and face the inevitable condemnation from peers. I had the honor to speak with many of the principle protagonists in this effort. After almost forty years, these men and women had gained valuable perspective. Some had recently published books chronicling their role in the return of evolutionary thinking, while others were happy to have me craft the first historical account of their experiences. Still others were reluctant to talk about sociobiology at all because "Answering your questions brought back many unhappy memories."[340] Taken together, these writings and interviews reveal how the scientific

[339] In fact, almost all of those involved in the return of biological analyses of human affairs embraced progressive values. J.B. Haldane and J.M. Smith were communists. E.O. Wilson was a social democrat. Even Robert Trivers, who had been labeled a racist by his opponents, was actually married to a Jamaican and heavily involved in radical black politics (Huey Newton was the godfather to his daughter!).

[340] Barkow, personal correspondence.

developments behind sociobiology inspired a cadre of intrepid academics to attempt a transformation of the social sciences, and, subsequently, the way in which educated Americans view the world.

Perhaps the most influential early "sociobiologist" was Richard Alexander, an entomologist at the University of Michigan who came to focus on human beings after he saw that an "inexcusably small percentage of the people writing about man today have not done their homework on the facts and the theory of evolution."[341] Alexander had decided early in his career that he wanted to "address broad questions concerning evolution," and that he was "going to proceed, for as long as I can, under the assumption that every trait of life can be explained by the process of organic evolution."[342] He soon realized, however, that evolution, despite its universal importance for all aspects of life, had been pigeonholed in biology. "As a student" he recalled, "evolution was never mentioned in the philosophy courses, and only as a nasty word in the psychology courses."[343] The disconnect in the social sciences from arguably the most important scientific theory in history baffled young Alexander, who believed that "because of its all-encompassing character, evolutionary theory is by nature philosophical in its

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[341] Richard Alexander, "The Search for an Evolutionary Philosophy of Man," *Proceedings of the Royal Society of Victoria, Melbourne* 84 (1971): 97.

[342] William Irons, "How Has Evolution Shaped Human Behavior? Richard Alexander's Contribution to an Important Question," *Evolution and Human Behavior* 26 (2005), 2.

[343] Alexander, "The Search for an Evolutionary Philosophy of Man,"100.

application to man."[344]

Alexander was aware, of course, of the acrimony following Wilson after his exposition of sociobiology, yet, as someone educated in the hard sciences (where evolution had not, indeed, could not, be shunned), he had not been inculcated with the same values as his colleagues in the social sciences and thus the taboo that they held dear held little meaning for him. "It is hardly reasonable to accuse a man of being a Social Darwinist," he lamented in "The Search for an Evolutionary Philosophy of Man," "because he argues for certain causes of historical events (if) the appellation has nothing to do with his views of what is desirable for the present and future of man. It is even less reasonable to imply that he must not analyze human behavior if his analysis—right or wrong—can be distorted or misused by others."[345] For Alexander, the time for academic politics was over; it was time to sincerely investigate the implications of evolution. He explained, "Prior to 1859 there simply was no general explanation of life, including man, that made any real sense," then Darwin changed everything, and now, thanks to recent developments in evolutionary biology, it was possible to begin the critical task of developing a general theory of behavior that encompassed all the disciplines.[346]

In the eyes of Alexander, a young scientist who loved to probe the nature of reality, the 1970s were a great time to be alive, for "the latter part of the twentieth-century witnessed great progress in our understanding of how organic evolution has

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[344] Ibid., 96.

[345] Ibid., 107.

[346] Ibid., 99.

shaped the behavioral and social aspects of the human species."[347] And whom did Alexander credit for the sudden leap forward? Hamilton.[348] Alexander revered the shy British iconoclast as "the greatest evolutionary biologist of his generation," as the "revolutionary thinker (who) gave biologists the tools for understanding sociality in all organisms."[349] By elucidating the evolutionary logic behind eusociality in insects, Hamilton had "affected the way biologists approached far broader issues, such as our views of the levels at which natural selection has operated--from genes to individuals and species, as well as from families to tribes and nations--and thus the basic reasons for organisms acting as they do."[350] To Alexander, Hamilton had brought science to the cusp of a viable evolutionary philosophy of man, and it was now "up to the rest of us to use and develop all such glimpses into the human condition to generate a self-understanding adequate to the task of significantly reducing human misery and strife across the globe."[351]

Not all scientists shared Alexander's missionary zeal, as the potential for personal and professional condemnation remained high. Discouraged by his colleague's reticence, Alexander complained that "people who understand evolution profoundly often are

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[347] Irons, "How Has Evolution Shaped Human Behavior?," 2.

[348] Evidence of the profound effect Hamilton's work had on Alexander can be seen in the forty-six references to Hamilton in Alexander's seminal work, "The Evolution of Social Behavior."

[349] Richard Alexander, "William D. Hamilton Remembered," *Natural History* 19 (June, 2000), 1.

[350] Ibid.

[351] Ibid.

reluctant to openly deliver honest, detailed, or complete descriptions of evolution and its past."[352] Even Will Hamilton, his inspiration, hesitated to take a stance. "I once heard Bill assert," Alexander recalled, "that he avoided applying his theories to humans because he thought such extrapolation was too difficult and too subject to misinterpretation."[353] Nonetheless, Alexander remained committed to analyzing human behavior through an evolutionary lens, for he believed that evolution was "no longer the property of a small group of biologists: to understand it thoroughly has become the responsibility of every person with a potential role in man's future."[354] Over the next forty years he would fearlessly speculate on evolution's role in morality, communication, culture, and a number of other pillars in human society. His papers serve as the seminal works of sociobiology today.

The time had come. Inspired by E.O. Wilson and the scientists upon whose shoulders he stood, Richard Alexander had violated the taboo against evolutionary analyses of human behavior. He, in turn, would inspire a new generation of thinkers to question, and then transcend, the existing boundaries of academic respectability. Over the next decades, the social sciences experienced significant upheaval as waves of sociobiologists introduced evolutionary perspectives to their disciplines. The first discipline to be so effected, and the one which experienced perhaps the greatest transformation, was anthropology. Here, in the discipline Franz Boas founded as a defiant

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[352] Richard Alexander, "Darwin's Challenges and the Future of Human Society," in F. Wayman, P. Williamson, and B. Bueno de Mesquita, eds., *Predicting the Future in Science, Economics, and Politics* (Ann Arbor: University of Michigan Press), 66.

[353] Alexander, "Hamilton Remembered," 1.

[354] Alexander, "The Search for an Evolutionary Philosophy of Man," 117.

response to evolution-inspired models of white supremacy, three young anthropologists dared to claim that human beings were animals with a lasting evolutionary heritage. Napoleon Chagnon, Sarah Hrdy, and Martin Daly came from diverse backgrounds and studied in separate schools; however, sociobiology motivated them all to think the unthinkable. After initial resistance to their work, they would each achieve academic acclaim for their iconoclastic speculations.

Napoleon Chagnon is not your typical academic, that is, unless Indiana Jones is your archetype of a professor. Born in 1938 in Port Austin, Michigan, Chagnon spent his time as a graduate student not sitting in dimly lit archives or staring at computer screens, but living with the Yanomami, an indigenous tribe in the remote Amazon jungle. Before he met the Yanomami, Chagnon eagerly imagined them to be a peaceful, loving community free from the sins of the technologically advanced world.[355] This rose-colored optimism resulted from his education in post-World War II anthropology, a discipline that embraced the notion that all people were inherently good and that the violence and greed plaguing modern nations was the by-product of capitalist competition rather than a reflection of human nature.

As Chagnon paddled up the river and introduced himself to the Yanomami, however, the reality of an angry villager, high on psychedelics and pointing a spear at him, caused him to begin reevaluating his preconceived notions. Remembering that fateful encounter almost forty years later, Chagnon explains, "The Yanomami were decidedly different from what I had imagined them to be in my Rousseauian daydreams" and, as such, he

[355] As appears to be often the case for indigenous peoples, the name they have for themselves, Yanomami, means simply "human beings" in their own language.

was forced to accept that his "assumption about the alleged social tranquility of the past may be idealistic and incorrect."[356] The more time he spent with them, the more he realized, "Among the Yanomami, native warfare was not just occasional or sporadic but was a chronic threat, luring and threatening to disrupt communities at any moment."[357] How could he explain the radical discrepancy between reality and anthropological theory?

Chagnon was well aware that "the standard, almost solemn, epistemological position in cultural anthropology when I was in graduate school was that humans have only a cultural nature."[358] So, at first, he tried to reconcile his findings with what he had learned in school. And, according to the "most scientific anthropological theory of primitive war of the 1960s…tribesmen, just like members of industrialized nations, fought only over scarce material resources—food, oil, land, water supplies, seaports, wealth, etc."[359] Yet, try as he might, Chagnon did not see members of the Yanomami fighting over these things. Instead, he found that "most Yanomami arguments and fights started over women."[360] Chagnon knew that his finding, that "warfare was common among the Yanomami and that it was apparently not caused by capitalist exploitation, nor was it a

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[356] Napoleon Chagnon, Noble Savages: My Life Among Two Dangerous Tribes: the Yanomamo and the Anthropologists (New York: Simon & Schuster, 2013), 7.

[357] Ibid., 26.

[358] Ibid., 29.

[359] Ibid., 26.

[360] Ibid., 26.

reaction to oppression by Western colonial powers" was dangerous for his career.[361] "Most anthropologists… believed that warfare and fighting were entirely determined by culture" and here he was, a young graduate student, raising the "possibility that warfare was, in a sense, a "natural" or "predictable" condition among tribesmen who not been exposed to or corrupted by capitalistic, industrialized, and/or colonial cultures."[362] Yet, despite the professional risks, Chagnon remained committed to describing the Yanomami as he found them.

A major source of strength for Chagnon's conviction to accurately depict the Yanomami came from the "major theoretical breakthroughs in evolutionary theory (that) occurred just prior to or during the time I began studying anthropology at the University of Michigan."[363] As the reader probably has already guessed, these breakthroughs were "a pair of papers that William D. Hamilton, an English biologist, published in 1964 in the *Journal of Theoretical Biology*, a journal that most anthropologists were not familiar with and did not read."[364] After the clear incongruence between what he found in the field and existing anthropological theory, Chagnon's "theoretical views on the anthropology of human behavior became increasingly affected by (these) new discoveries in theoretical biology."[365] In particular, he was "interested in Hamilton's theory of "inclusive fitness, also known as 'kin selection,' because it laid a new basis for understanding why kinship

[361] Ibid., 30.

[362] Ibid., 30.

[363] Ibid., 9.

[364] Ibid., 9.

[365] Ibid., 383.

relationships provided the rock-bottom source of social solidarity."[366] Now, armed with the tools of evolutionary biology, Chagnon could finally make sense of the violence he saw in the Amazon: "human warfare had as much to do with the evolved nature of man as it did with what one learned and acquired from one's culture."[367]

Chagnon's time in the Amazon jungle convinced him that the Yanomamo were without question a warlike people.[368] On an almost daily basis he witnessed examples of their aggression, which "ranged in seriousness from the ordinary incidents of wife beating and chest pounding to dueling and organized raiding by parties that set out with the intention of ambushing and killing men from enemy villages."[369] These raids were not ceremonial or symbolic, as over thirty percent of adult males died from the violence, and they had a tremendous influence on Yanomamo culture. Indeed, Chagnon claimed, "the thing that impressed me most was the importance of aggression in their culture."[370] Yanomamo mythology, settlement patterns, politics, and even marriage practices all reflected this martial spirit. To prove these assertions, Chagnon provided several anecdotes of the violence he witnessed. The combat ritual for infidelity serves here as a representative example: "The enraged husband challenges his opponent to strike him on the head with a club. He holds his own club vertically, leans against it and exposes his

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[366] Ibid., 383.

[367] Ibid., 28.

[368] This perception comes through loud and clear in the subtitle of his work, "The Fierce People."

[369] Napoleon Chagnon, *Yanomamo: The Fierce People* (New York: Holt, Rinehart and Winston, 1968), 9.

[370] Ibid., 8.

head for this opponent to strike. After he has sustained a blow on the head, he can then deliver one on the culprit's skill. As soon as blood starts to flow, almost everybody rips a pole out of the house frame and joins in the fighting, supporting one or the other of contestants."[371]

Reading Chagnon's field report one gets the feeling that his experience with the Yanomamo left a bad taste in his mouth. "Primitive man is not always as noble as you originally thought," he reveals in *Yanomamo: The Fierce People.*[372] It is not hard to understand why he had a negative impression of his hosts, as it appears that his time in the field was beset by constant strife and interpersonal difficulty. After almost a year of dedicated genealogy research, he discovered that the Yanomamo had been lying to him about each other's names the whole time. He bitterly recalled, "They enjoyed watching me learn these names. I assumed, wrongly, that I would get the truth to each question and that I would get the best information by working in public. This set the stage for converting a serious project into a farce. Each informant tried to outdo his peers by inventing a name even more ridiculous than what I had been given earlier."[373] Then they would roar in hysterics when he would inadvertently refer to people as "hairy vagina," "long penis, "feces of the harpy eagle," or "dirty rectum."[374] And while this may seem harmless, not everything he witnessed was so benign. In a culture where "men in general

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[371] Ibid., 11.

[372] Ibid., 3.

[373] Ibid., 11.

[374] Ibid., 11.

are cruel to their wives," Chagnon saw more than enough domestic abuse.[375] In one particularly gruesome incident the husband "commanded his wife to prepare food for them, but the woman moved a little too slowly to suit him (so Paruriwa, the man) grabbed an axe, and swung it wildly at her. She ducked and ran screaming from the house. Paruriwa then recovered his balance and threw the axe at her as she fled."[376] Incidents like these, combined with descriptions of malevolent personalities and continual harassment, give Chagnon's writing a critical tone.[377]

Chagnon's exciting stories of primitive violence made him one the country's most popular academics. Among fellow anthropologists, however, he achieved more notoriety than praise, as a discipline that remained committed to cultural analysis questioned his findings, his methods, and even his ethics. Jacques Lizot, a French anthropologist who spent more than fifteen years in a village near Bisaasi-teri, expressed his desire to "revise the exaggerated representation that has been given of Yanomami violence."[378] According to Lizot, "the Yanomami are warriors; they can be brutal and cruel, but they can also be delicate, sensitive and loving."[379] As the debate surrounding Chagnon grew, a conference titled "Tragedy in the Amazon: Yanomami Voices, Academic Controversy and the Ethics

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[375] Ibid., 69.

[376] Ibid., 95.

[377] "The thing that bothered me most was the incessant, passioned, and aggressive demands the Indians made. It would become so unbearable that I would have to lock myself in my mud hut every once in a while just to escape from it."

[378] Jacques Lizot, quoted in "How Napoleon Chagnon Became our Most Controversial Anthropologist," *New York Times Magazine*, Feb 13, 2013.

[379] Ibid.

of Research" brought together a number of those critical of Chagnon. David Maybury-Lewis, an anthropologist at Harvard University, established the negative tone of the conference, claiming that Chagnon's "dehumanization of the Yanomami is shocking," while Leslie Sponsel made explicit the liberal political values behind the opposition: "Future research with the Yanomami needs to pay far more attention to promoting their survival, welfare, self-determination and other human rights."[380] Eventually, the prestigious National Academy of Sciences awarded Chagnon membership for his groundbreaking work, but he could never shake the cloud of controversy that had followed him since he left the jungle.[381] The message was clear: anybody who introduced evolutionary thinking to anthropology was in dangerous waters.

Today Sarah Hrdy lives on her walnut farm in northern California. From there, she and her husband, David, aim to produce "the best quality walnuts in the world."[382] The farm appears to do quite well, shipping large quantities of walnuts all over the world. Despite the success of the farm, however, Hrdy's current dusty environs might surprise those who know her first and foremost as one of the country's most accomplished anthropologists. A closer look at Hrdy's early years, however, reveals that she is accustomed to, and perhaps feels most comfortable in, life outside a big city. Born in Dallas in 1946, she "grew up in Houston when it was still a fairly sleepy city with

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[380] David Maybury-Lewis and Leslie Sponsel, "Tragedy in the Amazon: Yanomami Voices, Academic Controversy and the Ethics of Research," Cornell University, Ithaca, New York, April 5-7, 2002.

[381] World-renowned Marshal Sahlins actually withdrew his membership from the organization in protest after Chagnon's admittance. An unprecedented act demonstrating the lasting antipathy Chagnon engendered among his critics.

[382] Citrona Farms, http://citrona.com, accessed March 14, 2017.

graceful oaks, long lazy gar and alligators swimming in the bayous, and cattle grazing along Buffalo Speedway."[383] The prevailing values of her childhood "were distinctly 'Southern,'" meaning "genteel manners, extreme segregation, and patriarchal institutions."[384] A younger child, and a daughter, her education was somewhat an afterthought, so her parents willingly indulged their daughter's love of horses and sent her to St. Timothy's all-girls school primarily because of its equestrian offerings. Fortunately, the headmaster took the academic aspects of the school seriously as well, and it was there young Hrdy developed a sincere, personal "lust to learn."[385]

Following in her mother's footsteps, Hrdy went to Wellesley College in Massachusetts in 1964. Befitting her infectious love of learning, she majored in philosophy, but her favorite class was on creative writing. Her major undergraduate project was a novel on "modern Mexicans of Mayan descent who were torn between their contemporary worlds and ancient heritages."[386] Specifically, her book was about the ancient legends that continued to haunt the people of Guatemala and Honduras because she was "interested in learning how and why human imagination invented demons."[387] Demonstrating an uncommon humility for someone her age, Hrdy realized that in order to write effectively about this fascinating subject "it would be helpful to actually learn

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[383] Sarah Hrdy, *Myths, Monkeys, and Motherhood: A Compromising Life, in Leaders in Animal Behavior*, eds. Lee Drickamer and Donald Dewsbury (Cambridge: Cambridge University Press, 2010), 344.

[384] Ibid., 344.

[385] Ibid., 345.

[386] Ibid., 346.

[387] Ibid., 346.

something about Mayans and their mythology," and this meant changing her major to anthropology.[388] For good measure, she also transferred to the women's branch of Harvard, Radcliffe, to study with Evon Vogt, who was then the world's expert on Mayan cosmology.

The book Hrdy eventually wrote, *The Black-man of Zinacantan*, was a conventional structural analysis in the manner of Claude Levi-Strauss, whose ideas dominated anthropological at the time. Hrdy's time at Harvard, however, exposed her to new ways of thinking that would cause her to eventually challenge traditional anthropological methods and perspectives. Thanks to her switch from the humanities to the social sciences, Hrdy began to think biologically, as the change in degree entailed a new set of required courses. During these classes Hrdy recognized a gender bias in the sciences, both in the lack of female scientists and in the depictions of female primate behavior. Again and again, she "would read that 'the most important, time-consuming role of the nonhuman primate female, and her primary focus as an adult, is motherhood. She raises one infant after another from the time she assumes adult roles ... until the time she dies."[389] Hrdy, however, felt something was amiss. Perhaps Clemence Royer, the French translator of *On the Origin of Species*, was right; scientists have misunderstood the role of females in nature all along because "science, like law, has been exclusively made by men (who) considered woman too often an absolutely passive being, without

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[388] Ibid., 346.

[389] Sarah Hrdy, "The One Animal in all Creation About Which Man Knows the Least," *Philosophical Transactions of the Royal Society of London, Series B, Biological Sciences* 368, no. 1631 (December, 2013), 1.

instincts or passions, or her own interests."[390]

Hrdy's nagging doubts about the "naturalness" of motherhood grew stronger after the discovery of infanticide among langur monkeys by The Japan India Joint Project, a research team led by Yukimaru Sugiyama. Infanticide was problematic for several reasons. Most importantly, it seemed a clear violation of the group selectionism still prominent at the time. Why on earth, evolutionary biologists speculated, would a dominant male member of a species kill a newborn? It seemed to serve no purpose. Female langur behavior also proved puzzling in this circumstance, as Sugiyama reported that they engaged in promiscuous sex with their own babies' killers. This was clearly not the "maternal" response scientists had expected to see. Intrigued, Hrdy, after a brief stint considering a career as a documentary filmmaker, decided to pursue a PhD researching infanticide.

Like Chagnon only a few years before, Hrdy recognized that the traditional explanations she learned in school had fundamental flaws. Fortunately, she would also come across the tools needed to unravel the paradoxes into logical explanations. The very first semester of graduate school she handed in a paper to a "cocky graduate student" that bluntly critiqued her work.[391] His name: Robert Trivers. The unflinching feedback had set the two off on rocky footing, but even then Hrdy "had a dawning awareness he might be someone worth learning from."[392] Trivers soon established himself as "the most inspirational teacher (Hrdy) ever had" and, by the end of the academic year, she had to

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[390] Ibid., 1.

[391] Hrdy, "Myths, Monkeys, and Motherhood," 350.

[392] Ibid., 350.

come to understand "how important Trivers' stunningly original ideas about the connection between parental investment and Darwinian sexual selection were for understanding infanticide" among the langurs.[393] The next spring, Hrdy took a seminar taught by none other than E.O. Wilson. According to Hrdy, Wilson's "sense of mission was infectious," and the class devoured the writings of the "prophet," W.D. Hamilton, and contemplated the integration of "ecology, demography, genetics, development, behavior, and evolutionary theory in one grand explanatory framework."[394] It was a perfect storm of intellectual influences, and Hrdy emerged a powerful, controversial anthropologist. In her own words, "I already felt a profound debt to Trivers and Wilson and considered myself a sociobiologist."[395]

For the next five years Hrdy would spend over fifteen hundred hours in the jungles of India in order to learn more about langur monkeys. During this time she became convinced that infanticide occurred on a regular basis and could not, therefore, be considered a pathological aberration. In fact, after one abandoned the logic of group selectionism, the behavior appeared perfectly logical. From a gene-centered evolutionary perspective the murder of an infant by a new dominant male makes sense, as the removal of nursing dependents returns the females to estrus sooner. Essentially, according to Hrdy, "Infant-killing is a reproductive strategy whereby the usurping male increases his own reproductive success at the expense of the former leader (presumably the father of

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[393] Ibid., 350.

[394] Ibid., 350.

[395] Ibid., 352.

the infant killed)."[396] Gruesome? Yes. But no longer an evolutionary mystery.

What was not understood, what had not really been studied, actually, was the female's response to the murder of her offspring. Hrdy observed that "after a new male takes over, females may form temporary alliances to prevent him from killing their infants." No surprises there; a new mother would be expected to protect her offspring. Unfortunately, however, while the females "are often able to delay infanticide. Less often are they able to prevent it. Pitted against a male who has the option to try again and again until he finally succeeds, females have poor odds."[397] So, how do they respond? The answer is, incredibly, that "in many cases when a usurper does attack and injure an infant despite the mother's efforts at protection, the mother abandons it."[398] According to Hrdy, the "desertion reflects a practical evaluation of what *this* infant's chances are weighted against the probability that her next infant will survive."[399] Far better to move on and rear successful offspring than expend valuable resources on an infant with no future.

And what about pregnant females? How did they behave in these scenarios? Writing in classic understatement, Hrdy claims, "It may be significant then that at Dharwar, Jodhpur, and Abu, pregnant females confronted with a usurper displayed the traditional langur estrous signals: the female presents her rump to the male and frenetically shudders her head. These females mated with the usurper even though they

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[396] Hrdy, "Myths, Monkeys, and Motherhood," 353.

[397] Sarah Hrdy, "Infanticide as a Primate Reproductive Strategy," *American Scientist* 65, no. 1 (January-February, 1977): 48.

[398] Ibid., 48.

[399] Ibid., 48.

could not possibly have been ovulating at the time. Postconception estrus in this context may serve to confuse the issue of paternity."[400] In other words, she had sexual intercourse with the new dominant male in order to make him think he was the father of her baby! The female langurs that Hrdy studied were clearly not passive breeders, patiently waiting to see which male would gain access to them. Conversely, they were active and strategic players in the competition of genetic reproduction.

Hrdy's controversial findings generated a firestorm of debate.[401] Forty years later, she is able to recall the emotional experience with objective detachment, "my proposal in the January-February 1977 issue of the *American Scientist* provoked a series of rebuttals."[402] At the time, she admits, "the controversy caught me by surprise" and caused her much distress.[403] Hrdy now believes she can "divide the saga into two phases."[404] The first phase of the critiques was primarily scientific in nature, as critics believed Hrdy had mistakenly labeled infanticide as adaptive. Because she was a sociobiologist, they argued, Hrdy was intent on providing evolutionary explanations for behavior even when the evidence did not support it. For example, the first Western primatologist to study langurs in the wild, Jay Dolhinow, opined, "It comes as great surprise that infanticide might be considered a normal adaptive evolutionary strategy…because 'normal' langurs do not kill

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[400] Ibid, 48.

[401] Amanda Rees, *The Infanticide Controversy: Primatology and the Art of Field Science* (Chicago: University of Chicago Press, 2006).

[402] Hrdy, "Myths, Monkeys, and Motherhood," 353.

[403] Ibid., 354.

[404] Ibid., 354.

infants."[405] In a similar vein, another scientist claimed, "Most witnessed cases of infant killing appear to be simply genetically inconsequential epiphenomena of aggressive episodes."[406]

In Hrdy's opinion, these early critiques were "useful, (and) ultimately constructive" because they "made me think harder about my main underlying premise."[407] The second phase of the controversy, which she views as "far less constructive," occurred largely outside the natural sciences, as anthropologists took umbrage at the implications her work held for human beings.[408] In articles like "Monkey 'Murderers' may be Falsely Accused," they refused to acknowledge any scientific legitimacy to claims of adaptive infanticide, arguing that "there was *no* evidence for a genetic basis for infanticidal behaviors."[409] When other scientists began to explicitly test Hrdy's theories on human beings, the "anthropologists began refusing to sanction publication of data on infanticide in traditional societies."[410] At first, Hrdy tried to be conciliatory toward her detractors, writing that she and they represent "two different world views, both of them defendable."[411] In the face of unrelenting attacks, however, she decided to throw caution to the wind and focus almost entirely on human

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[405] Ibid., 353.

[406] Ibid., 356.

[407] Ibid., 354.

[408] Ibid., 355.

[409] Ibid., 356.

[410] Ibid., 355.

[411] Ibid., 357.

sociobiology.

Hrdy's next books all analyzed human behavior from an evolutionary perspective. Specifically, she focused on women. And, counter to the anxieties of sociobiology's feminist critics, her findings did not justify patriarchy. In fact, one of her central claims challenged a long-standing biological explanation of gender roles: the myth of sexually "coy" women courted by undiscriminating men. According to Hrdy, this myth began when Darwin painted nature with a Victorian brush and was given further validation by A.J. Bateman's research on the Drosophila fly, which showed that "males improved their genetic representation in succeeding generations by mating with as many partners as they could, while females did not so benefit."[412]

Over time, most evolutionary biologists accepted Bateman's findings as proof of the two sexes differing reproduction strategies. The resulting, unquestioned narrative depicted women as highly particular in their choice of sexual partners because they invested so much more in offspring than fathers. In monetary terms, sperm was "cheap," as men can conceivably father dozens or even hundreds of children without any necessary personal sacrifice. Women's reproductive potential, on the other hand, was limited by their relatively small supply of gametes and pregnancy. Thus, there might be some scientific support for the trope of eager boyfriend and reluctant girlfriend. In her extensive research, however, Hrdy found that "a polyandrous component is at the core of the breeding systems of most troop-dwelling primates: females mate with many males,

[412] Sarah Blaffer Hrdy, *The Woman That Never Evolved* (Cambridge: Harvard University Press, 1981), xiv.

each of whom may contribute a little bit toward the survival of offspring."[413]

If, indeed, Hrdy was right, and female promiscuity is quite common in the natural world, how on earth did so many scientists get it so wrong for so long? Hrdy believes, "It is impossible to understand this history without taking into account the background, including the gender, of the researchers involved."[414] Until very recently, men have dominated scientific inquiry. In her own education, Hrdy recalls "sitting in a simian seminar at Harvard and the discussion revolved around women being exchanged between groups as a way of connecting male brotherhoods and achieving alliances between groups. I remember thinking to myself, 'This is what it must be like to be a black person listening to a lecture in support of the Ku Klux Klan.'"[415] Having experienced such a gendered bias in science personally, Hrdy became convinced it was not "just chance or just historical sequence that caused a small group of primatologists in the 1960s, who happened to be mostly male, to focus on male–male competition and on the number of matings males obtained."[416] By bringing a woman's perspective to a male-dominated discipline, Hrdy was able to open the window on an entirely new side of sexual selection, one that recognized the myriad options available to females attempting to maximize their reproduction.

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[413] Sarah Blaffer Hrdy, "Empathy, Polyandry, and the Myth of the Coy Female" in *Feminist Approaches to Science*, ed. Ruth Bleier (New York: Pergamon, 1986), 137.

[414] Ibid., 132.

[415] Eric Michael Johnson, "Raising Darwin's Consciousness: An Interview with Sarah Blaffer Hrdy on Mother Nature," *Scientific American*, https://blogs.scientificamerican.com/primate-diaries/raising-darwins-consciousness-an-interview-with-sarah-blaffer-hrdy-on-mother-nature/#, accessed May 12, 2017.

[416] Hrdy, "Empathy, Polyandry, and The Myth of the Coy Female," 147.

A woman's reproductive calculation does not stop at intercourse. After the child is born she is faced yet again with an important decision: whether or not to keep the baby. Sure, women can choose to devote themselves to their children, and many of them do; however, in reality "how much a mother commits to an offspring depends on the circumstances."[417] Young girls have many fertile years ahead of them and it is not always in their best interest, evolutionarily speaking, to commit to an infant if she is of low status or lacking resources. Like the female langur who abandons her infant when a new dominant male arrives, women have throughout history found themselves in situations that cause them to withhold the necessary care from their baby. Perhaps the newborn is sickly or perhaps the father has died or fled. There are numerous reasons a mother might make this tough decision.[418] The prevalence of infanticide in human history, however, does not mean the choice is easy:

> Just because *Homo sapiens* mothers have a "long history" of opting not to rear specific infants born at specific times, does not mean this was "routine" or typical. Post-partum abandonment or infanticides, or retrenchment later, were situation-dependent with infanticide undertaken regretfully.[419]

It is important to remember that the women who chose to abandon or kill their infants were not necessarily rejecting motherhood. Many of them hoped to raise healthy children

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[417] Sarah Hrdy, *Mother Nature: A History of Mothers, Infants, and Natural Selection* (New York: Pantheon Books, 1999), 79.

[418] A baby requires sacrifices from many people, not just the mother. For this reason, cultures across the world and through time developed elaborate rituals to discard babies seen as a burden. Baptism, for example, might have derived from the "early Celtic-Germanic practice of exposing children to cold or immersing them in cold water," a rite designed to "set a threshold of viability below which an infant would not be reared." Hrdy, *Mother Nature,* 474.

[419] Hrdy, personal correspondence.

one day but realized they were not able to do so in their present circumstances. Hrdy explains the paradox of hopeful mothers committing infanticide quite well, "In species where survival of young requires extensive care, the single most important source of variation in female reproductive success is not how many young are born; what matters is how many survive and grow up to reproduce themselves. For such creatures, survival of at least some young requires reproductive discretion. *This is why being pro-life means being pro-choice* (my italics)."[420]

Ironically, Hrdy did not experience the same degree of resistance to her theories about human infanticide as she did after the publication of her work on infanticide among langur monkeys. By this time she was a self-described "outspoken supporter" of sociobiology, so one might have expected the critics to rally against her.[421] Hrdy certainly did. Now safely retired on her farm, she can humorously recall, "When *The Woman That Never Evolved* first appeared, in 1981, I feared that it would terminate a promising academic career—namely, my own."[422] However, at the time, the threat of professional demise felt very real to Hrdy. The "fierce controversy over sociobiology's supposed conservatism, racism, and sexism was raging" all around her and Hrdy was well aware that "a McCarthyesque smear campaign (from the Left this time) was under way."[423]

Potentially she could have mitigated any potential attacks by condemning her sociobiological mentors and explicitly aligning her research with feminism, but that

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[420] Hrdy, *Mother Nature*, 90.

[421] Hrdy, personal correspondence.

[422] Hrdy, *The Woman That Never Evolved*, xiii.

[423] Ibid., xvi.

would have been disingenuous as "feminism *per se* had little to do with the conclusions (she) reached."[424] Besides, despite her critique of gender bias in the natural sciences, Hrdy had a favorable view of the men she worked with and the scientific method in general—both of which were viewed with considerable skepticism by feminists. To Hrdy, science was inherently "inefficient, biased, frustrating, replete with false starts and red herrings, but nevertheless responsive to criticism and self-correcting, and hence better than any of the other more unabashedly ideological programs currently being advocated."[425] When she "did encounter feminist writings (she) was often put off by the poor quality of the scholarship," and she didn't identify with their emphasis on conflict to achieve equality.[426] In her own experience, what stood out most was the support of "prominent biologists like George Williams, John Maynard Smith, and William Eberhard who joined their women colleagues in urging more open discussion about how 'inadvertent machismo' had affected the way sexual selection theory had been applied."[427] In fact, to Hrdy, it was remarkable "how little resistance researchers in (her) own field have exhibited when biases are pointed out."[428]

This is not to say that Hrdy aligned herself with sociobiology and against feminism. To her, that was a false binary. She hoped instead to carve out a new path forward that incorporated the best of both perspectives. Hrdy saw herself as a lonely

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[424] Ibid., xix.

[425] Hrdy, "Empathy, "Polyandry, and the Myth of the Coy Female," 152.

[426] Ibid., 151.

[427] Hrdy, *The Woman That Never Evolved*, xvii.

[428] Hrdy, "Empathy, "Polyandry, and the Myth of the Coy Female," 152.

voice hoping to engage in the "dialogue between evolutionists and feminists that has to happen if we are to build the current experiment in women's rights on a more secure foundation, based on a deeper understanding."[429] As a young academic she was certainly in a tough position. Nonetheless she set two major goals for her initial effort at reconciliation: "On the one hand I wanted to convince fellow sociobiologists that we had to widen our field of vision to include the interests and perspectives of both sexes if we were to have a comprehensive understanding of the evolutionary process. On the other hand, by broadening Darwinian stereotypes of female nature to be more realistic, I hoped to reach out to women long skeptical about the proposition that biology was irrelevant, but nevertheless felt compelled to reject explanations they viewed as irredeemably biased by patriarchal preconceptions."[430]

With one foot in two seemingly irreconcilable camps, how was Hrdy able to avoid significant backlash against her sociobiological research on humans? Looking back, she explains the lack of vitriol as a "stroke of good fortune, (as) an early review appeared in the radical Washington D.C., newsletter *Off Our Backs*. The reviewer had a background in biology, grasped my intentions, and declared that 'every aspect' of the book reflects feminist perspective."[431] Thereafter, Hrdy was met by those in women's studies and related fields with "polite nods." Many feminists still challenged her findings, of course, but the general tone of the discourse was respectful, if not friendly, from that point forward. She had the green light to proceed—not that she needed it—and she continued

[429] Hrdy, The Woman That Never Evolved, xxvii.

[430] Ibid., xvi.

[431] Hrdy, "Myths, Monkeys, and Motherhood," 364.

to utilize sociobiology to provide novel, feminist interpretations of evolutionary history.

The next target in her aim was the nuclear family. Long hailed as the most "natural" arrangement in which to rear children, Hrdy set out to demonstrate that, in fact, the concept of a nuclear family was relatively new and that humans actually evolved in complex intergenerational families comprising both relatives and friends. According to Hrdy, the immense size of human heads, which are due to our disproportionate brain development, meant that babies must be born incredibly premature relative to other animals. It takes over ten years before a human becomes capable of caring for itself and this dependency places an inordinate burden on others. A mother alone, or even a mother and father, would have been hard pressed to raise their children in prehistoric times without help (it's pretty darn hard today, for that matter).

Hrdy argues that parents have not done it alone for the vast majority of our history.[432] While many species have alloparents, which are nongenetic caregivers, "no other immatures depend on others to provision them for years the way that human children do."[433] In fact, human beings evolved to both elicit and provide this help. "Mirror neurons" are so named because they are activated when you do something—or when somebody else does. They are, literally, the physiology of empathy, and they are responsible for your anguish when your favorite sports team loses as well as the joy you feel when the boy gets the girl in the movie. And while these examples might seem

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[432] An implicit message here, and one that Hrdy does touch on briefly, is that we should be supportive of the "alternative" families that some have argued are a threat to "traditional" values. If children's welfare is the central concern, what is ideal is to have several loving adults in their life—regardless of their gender or sexuality.

[433] Sarah Hrdy, *Mothers and Others: The Evolutionary Origins of Mutual Understanding* (Cambridge: Harvard University Press, 2009), 80.

trivial, mirror neurons were a critical adaptation for our early ancestors because "the neuro-cognitive machinery of imitation lies at the origins of empathy" and it was human beings' strong emotional bonds that allowed them to successfully work together in groups and hunt larger animals—no small feat.[434]

Hard-wired to empathize with one another, it was natural that other humans would participate in the care of helpless infants.[435] Despite the current emphasis on nuclear families in the West, societies throughout history have embraced the alloparental model. For example, in eighteenth-century France only five percent of mothers nursed their own babies thanks to the prevalence of "wet nursing." Across the ocean and a century later, the Comanche Indians also established networks of care giving. But watch out! The Comanche depended on alloparents to such an extent that they kidnapped new ones from neighboring towns when their numbers fell due to war or illness.

Hrdy's unprecedented scientific feminism stands as one of the seminal sociobiological contributions of the 1970s. She complicated notions of motherhood, demonstrating that females are not uniformly devoted to their offspring—as had been supposed—but are in fact quite strategic in their commitment. Similarly, she undermined the scientific rationale for sexual double standards by proving the now obvious fact that

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[434] A.N. Meltzoff, "Imitation as Mechanism of Social Cognition. Origins of Empathy, Theory of Mind, and the Representation of Action," in *Handbook of Childhood Cognitive Development*, ed. U. Goswami (Oxford: Blackwell Press, 2002), 24.

[435] A thought experiment to test the theory of instinctual empathy is to consider the difference between seeing someone starving to death in the same room as you compared to the more abstract knowledge that millions are starving to death at this moment. Most people will feel compelled to help the starving individual in their presence but not do much for those they see suffering on television. This irrational response only makes sense when you recognize that empathy is not the result of utilitarian analysis but rather emotional instinct.

female primates actively participate in sexual selection based on their own interests and are not simply passive spectators to male competition. Having removed the Victorian emphasis on domesticity and chastity from the evolutionary paradigm, she then stripped away the scientific justification for another pillar of conservative values: the nuclear family. Yes, a child benefits from having more than one adult in her life, but what is in fact "natural" (if you are searching for guidance from our evolutionary past) is a multi-generational support system of friends and family, not mom and dad at home with the kids. All of these insights were major developments in evolutionary biology and they continue to support gender equality by providing scientific backing for women's issues.[436]

Martin Daly was another young anthropologist inspired by the possibilities of behavioral analysis from a gene-centered perspective. Like many of his peers involved in the return of evolutionary thinking to the social sciences, Daly was an atypical academic. In his case, however, it is not rugged Amazonian adventures or scientific feminism that set him apart. It is love. For, to speak of Dr. Daly, one must inevitably speak of his collaboration with Margo Wilson, who stood by his side as both colleague and wife for the length of his academic career. Although both Canadian, they came from different worlds. She was from a small town in the Northwest Territories, where she was educated in a one-room schoolhouse as the only non-first-nations child. Conversely, Daly grew up in Toronto, a diverse metropolis. The two met in 1974 at the University of Toronto and

[436] Abortion, for example, can be seen as a more humane form of infanticide, which Hrdy has shown to be a critical option in female homo sapiens' reproductive strategy. Additionally, Hrdy's work unequivocally demonstrates the benefit of gender parity in the sciences in order to mitigate bias.

then again in a conference in North Carolina. After that day, according to Daly, "I followed her home back to Toronto, and I wouldn't leave."[437] That was the start of an incredibly rewarding relationship personally and professionally. After all was said and done (she passed away in 2009), the two of them worked together on three groundbreaking books as well as over a hundred articles.

Like Hrdy, Daly and Wilson studied animal behavior before shifting their focus to human beings. In personal correspondence, Daly recalled, "I was a psychology student at the University of Toronto (my home town) when, under the influence of Jerry Hogan, I decided that animal behaviour was what I wanted to study."[438] At the time, of course, Wynne-Edwards' theories held great influence, and as a result, "many biological scientists subscribed to an unexamined 'greater goodism' (in philosopher Helena Cronin's felicitous phrase), interpreting the behavior of animals as a means to the end of 'reproducing the species.'"[439] Group selectionism was not without its merits. It did manage to explain a lot of the cooperation among animals, however, it failed to explain the antithesis of cooperation: violence. As a result, there was tremendous debate around male competition for females. Did individual animals purposefully restrain the violence of their competition in order to keep the species as a whole healthy or were the participants actually trying to hurt each other? According to Daly, "as late as 1966

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[437] Obituary: "Margo Wilson's Research Shed Light on Evolutionary Psychology," *The Globe and Mail*, accessed August 22nd, 2016, http://www.theglobeandmail.com/news/national/margo-wilsons-research-shed-light-on-evolutionary-psychology/article1203620/

[438] Daly, personal correspondence.

[439] Martin Daly and Margo Wilson, *The Truth about Cinderella: A Darwinian View of Parental Love* (London: Weidenfield & Nicolson, 1998), 11.

Lorenz (The Pulitzer Prize winning ethologist) was arguing that competition was ritualistic and never lethal."[440]

Previously, Hrdy had challenged the notion that peaceful competition was natural and violence was pathological. Her research on monkeys had used Trivers' theory of parent-offspring conflict to explain the very real violence of infanticide as a result of male competition. Soon, Daly and Wilson would make similarly startling claims about violence among human beings. "In 1976," Daly writes, "we were among the cheerfully disputatious participants in a weekly evening seminar in California, working our way through Harvard entomologist Edward O. Wilson's Sociobiology."[441] The class discussions, which were filled with "excitement and occasional acrimony," focused on Hamilton's "idea that organisms are designed by natural selection to contribute to the replication of their genes (rather than) merely to reproduce."[442] To Daly, "It was pretty obvious once you grasped the theory that this was a sound refinement of the ways in which we had previously thought of fitness."[443] Further, he and Wilson quickly surmised, "the evolutionary functionalism of sociobiology offered an exciting and potentially integrative perspective for the behavioral sciences."[444]

Motivated to participate meaningfully in the sociobiological project, the two of

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[440] Ibid., 15.

[441] Ibid., 19.

[442] Martin Daly and Margo Wilson, S*ex, Evolution, and Behavior* (Boston: Willard Grant Press, 1978), 30-31.

[443] Daly, personal correspondence.

[444] Daly and Wilson, Sex, Evolution, and Behavior, vii.

them decided to write a synthesis of the new research in a format accessible to educated laymen. The result, *Sex, Behavior, and Evolution*, succeeded in introducing sociobiology to a generation of undergraduate students across the country. Daly and Wilson, aware that many of their readers would be unfamiliar with basic biology or evolution, address these fundamentals in the first four chapters—paying special attention to the distinctions between "k" and "r" selection strategies as well as proximate and ultimate causation because these concepts are critically important to sociobiology.[445] Having summarized the existing literature on animal behavior, the authors made their bold switch to human beings. Considering the treatment Hrdy, Chagnon, and Wilson received, this could not have been an easy decision; however, they were "certain…that evolutionary biology ha(d) profound implications for the social sciences," so they pressed forward.[446] In example after example they made their case that "women and men behave differently," and that the difference can be explained more effectively through evolutionary analysis than discussions about patriarchy and cultural conformity.[447]

Sex, Evolution and Behavior received more praise than criticism, but most of the attention came from within biological rather than anthropological circles. *The Quarterly Review of Biology* recognized the interdisciplinary value of the book and championed it

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[445] r/K selection theory claims that selective pressures drive evolution toward either having lots of offspring, but providing them with little investment, or having few offspring and caring for them more. Human beings, whose infants are dependent for so much longer than any other species, and who have relatively few offspring, are one of the most "K" species in the world. This disproportionate care, the theory goes, has tremendous consequences.

[446] Ibid., 343.

[447] Ibid., 266.

as "highly recommended to all biologists and social scientists," yet endorsements like these had little influence in academia at-large (How many social scientists read biology journals?).[448] The next step for Daly and Wilson was to focus explicitly on humans. There had been calls within sociobiology to analyze human behavior through an evolutionary lens, and now was the time to put something on the table that demonstrated the benefit of such an approach. The duo decided to write about the genetic logic behind crime because "Influential analyses of criminal behavior were flawed due to reliance on model of humans as passive absorbers of culture."[449]

What did they find? Well, in one sense, they simply provided evolutionary explanations for common sense observations. For example, everywhere in the world, most of the killing is between men. And while this is not a startling revelation to anyone who watches the news, Daly and Wilson's explanation was indeed novel. They argued that men were disproportionately violent because their great variation in reproductive success makes them intensely competitive. In other words, while most women will have more or less the same number of children, dominant men have the potential to reproduce with multiple women and subordinate men often go childless. From this perspective, one can make sense of the seemingly senseless violence on television. As ugly as it may be, Daly and Wilson claimed, over the millennia evolution has selected for men who took decisive action when their reproductive potential was threatened—either directly through infidelity or indirectly through a challenge to their social status. Of course, this finding

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[448] Richard D. Howard, "Review of Sex, Evolution, and Behavior," by Martin Daly and Margo Wilson, *The Quarterly Review of Biology* 54. no. 1 (March, 1979): 84.

[449] Martin Daly and Margo Wilson, *Homicide* (Piscataway: Transaction Publishers, 1988), 52.

was not meant as an excuse for murder, but as information provided in the faith that a just a society is most effectively built through knowledge.

Having written an influential textbook and a seminal paper of sociobiology, it would have been understandable if Daly and Wilson rested on their now tenured laurels and coasted into the academic sunset. But they were not finished, for they still had an intellectual itch to scratch. Back in graduate school when they were first thinking of sociobiology projects that would give them the opportunity to test their newfound ideas, "a graduate student named Suzanne Weghorst raised the question: hey, what about stepparents? Everyone knows the stereotype" they're hostile and wicked, right? Well, is there any truth behind the stereotype?"[450]

Intrigued by their classmate's questions, Daly and Wilson decided to write *Cinderella: A Darwinian View of Parental Love*. The first thing they discovered in their research was that evil stepparent stories are nearly universal: "It really is true that virtually everyone, everywhere, is familiar with stories about unjustly treated stepchildren."[451] Beyond fairy tales, however, they also found a darker truth, that having a stepparent is an incredibly dangerous risk factor for child abuse. Using data from the American Humane Association, Daly and Wilson learned that "a child under three years of age who lived with one genetic parent and one stepparent in the United States in 1976 was about seven times more likely to become a validated child-abuse case."[452] And, when dealing with fatal child abuse cases, the risk grew a hundredfold! Another indicator that

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[450] Daly and Wilson, *Truth about Cinderella*, 20.

[451] Ibid., 2.

[452] Ibid., 27.

genetic relatedness plays an important role in the relationship between parent and child was the differentiation in the type of violence seen in child abuse cases. Typically, parents who murdered their genetic children did so as part of a murder-suicide and the act itself was passive, such as sleeping pills or carbon monoxide. Eighty percent of stepfathers who killed their children, on the other hand, were "found to have battered, kicked or bludgeoned their victims to death."[453] Viewing the grisly evidence through a sociobiological lens, Daly and Wilson concluded that natural selection could explain the phenomenon of stepparent violence, as "a hypothetical psyche that treated stepchildren and genetic children alike would be a psyche vulnerable to exploitation, and would be evolutionarily unstable in competition with more discriminating alternatives."[454] Much like in their study of homicide, the authors rejected "the curiously prevalent notion that a scientific, materialistic, Darwinian world-view is uglier than its anti-scientific alternatives" because they had faith that "more realistic worldviews invite more humane attitudes and practices than fantastic ones."[455]

Some critics bemoaned their evolutionary analysis because they found "the proposition that stepchildren are not loved like genetic children…distasteful."[456] To them, Daly had a firm response: "Biology is the study of life and the functioning of living things. (You won't get far studying living creatures with sole reference to gravity and other forces that impinge on organisms as they do on rocks.) The human sciences are

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[453] Ibid., 35.

[454] Ibid., 66.

[455] Ibid., 65.

[456] Ibid., 65.

branches of biology, regardless of whether their practitioners understand that that is the case, and those who insist that 'biology' is some sort of evil counter-discipline are simply depriving themselves of the benefits of knowing about potentially relevant theory and research in *other* branches of biology than their own."[457] Also, be warned before attempting to counsel Daly on Durkheim's injunction to rely on social science authorities for insights into human behavior. According to Daly,

> Durkheim had his virtues, but his commitment to defending (and thereby isolating) sociology from psychology and biology was and still is damaging. I classify Freud with gurus and god-slingers: their stories (and perhaps their calm, authoritative personae) find receptive audiences among those who have no time or taste for the messy business of science, i.e., for confronting their beliefs with real-world data bearing on those beliefs' validity. These and other such figures, and the impulses that they represent and exploit, remain an impediment to critical thinking and interdisciplinary dialogue very generally.[458]

The gloves were off. And sociobiology was just getting started.

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[457] Daly, personal correspondence.

[458] Daly, personal correspondence.

THE RETURN OF BIOLOGY IN ANALYSES OF HUMAN AFFAIRS

The pioneering efforts to reintroduce evolutionary thinking in anthropology opened the door for intellectuals in other disciplines to follow suit. Logically, sociology would be the next "domino" to fall because it, too, explicitly analyzed human behavior; however, that would not be an easy task. As previously mentioned, the principal theoreticians of sociology were all committed to a strictly cultural analysis of human affairs for both intellectual and political reasons. August Comte, Emile Durkheim, and Claude Levi-Strauss towered over sociology even from their graves and they would not go quietly into the night. To effectively challenge the prevailing dogma required a truly iconoclastic thinker, one who was not timid to the prospect of adversity.

Nobody ever called Pierre van den Berghe timid. Born in 1933 into generations of learning and wealth, he identified with his grandfather who "could so dominate his world by sheer strength of intellect" and was "impatient of anything but excellence."[459] In addition to his admitted "intellectual elitism," the dashing van den Berghe (he always dressed impeccably and flaunted a large, well-groomed mustache) had lived in the Belgian Congo and experienced the Nazi occupation of Belgium before he committed

[459] Pierre van den Berghe, "From the Popocatepetl to the Limpopo," in *Authors of Their Own Lives: Intellectual Biographies of Twenty American Sociologists*, ed., Bennett M. Berger (Berkeley: University of California Press, 1990), 412.

himself to academia.[460] This was not a man who would shrink from a fight. He believed that there were two approaches to science: one is "safe, but precludes theoretical development. The other takes the plunge into generalization." Needless to say, his "own inclination went to the second approach."[461]

Sociology in the 1960s lacked a solid theoretical foundation because of its post-modern preference for subjectivity. Consequently, after several years of research in Africa and Mexico, van den Berghe became disillusioned with his discipline's limitations and he dismissed sociology as "a pretentious and inchoate mixture of fact and ideology."[462] Seeking an alternative approach, "Edward Wilson's 1975 book *Sociobiology: The New Synthesis* suddenly seemed to point the way" and before long he found himself "in the clutch of concepts recently developed by the new science."[463] "Culture," he realized, could "only be fully understood as part of the process of biological evolution."[464] This is not to say, as the critics of sociobiology alleged, that he sought to reduce human behavior to biology. No, "sociobiology will never be able to explain the French Revolution."[465] But it might explain why we have revolutions at all—and this was

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[460] Van den Berghe, "From the Popocatepetl to the Limpopo," 414.

[461] Pierre van den Berghe, "Reply to Fleising and Labovitz, and Turner, Turner and Fix," *American Sociological Review* 41, no. 3 (June, 1976), 556.

[462] Pierre van den Berghe, *Man in Society: A Biosocial View* (New York: Elsevier Publishing, 1975), ix.

[463] Van den Berghe, "From the Popocatepetl to the Limpopo," 428.

[464] Van den Berghe, "Royal Incest: A Reply to Sturtevant," *American Ethologist* 8, no. 1 (February, 1981), 187.

[465] David Barash and Pierre van den Berghe, "Inclusive Fitness and Human Family Structure," *American Anthropologist* 79, no. 4 (Dec, 1977), 821.

something he wanted to explore. As he began his research, van den Berghe "soon discovered that the pieces to the puzzle, which Wilson had conveniently assembled, had all been around for over a decade. Wilson was not so much the innovator as the synthesizer."[466] In 1976 he took the first sabbatical of his career, "largely to retool as a sociobiologist studying humans" and he used this time to meet with the "leading lights in the field" such as Richard Alexander, Will Hamilton, E.O. Wilson, and Robert Trivers.[467]

Upon his return, van den Berghe chose to study incest. To laymen, this might seem a marginal and grotesque aspect of human behavior to research, but to sociologists incest could be considered the holy grail of research projects because the discipline assumed human behavior was a response to unique cultural contexts and thus one would not expect to find universal behaviors—yet the taboo against incest exists in every society. What was the explanation? Inspired by Marcel Mauss's *The Gift*, Levi-Strauss had argued that the incest taboo was the foundation of human culture because it facilitated the essential exchange of women among neighboring groups of people. These exchanges were necessary because they have a "significance that is at once social and religious, magic and economic, utilitarian and sentimental, jural and moral."[468] In other words, they bring people together in important ways. As evidence for his claim, he

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[466] Van den Berghe, "From the Popocatepetl to the Limpopo," 428.

[467] Ibid.

[468] Claude Levi-Strauss, *The Elementary Structures of Kinship*, translated by James Harle Bell and John Richard von Sturmer (Boston: Beacon Press, 1969), 52.

referred to Margaret Mead's interviews with young Samoans, who responded to her queries about incest with indignation: "What, you would like to marry your sister? What is the matter with you anyway? Don't you want a brother-in-law? Don't you realize that if you marry another man's sister and another man marries your sister, you will have at least two brothers-in-law, while if you marry your own sister you will have none? With whom will you hunt, with whom will you garden, who will you visit?"[469]

Van den Berghe had a different explanation. He argued that the incest taboo was universal because too many shared genes were unhealthy so evolution had selected against those who slept with their siblings. As a result, modern human beings "naturally" felt an aversion to incest. Still, questions remained, for nobody knew exactly how a biological predisposition to avoid incest would work. Are humans somehow able to subconsciously recognize their kin through sight or smell? In *Human Family Systems*, van den Berghe elucidated an unexpected mechanism for maintaining genetic diversity: a lack of sexual attraction toward people with whom one was raised. He arrived at this remarkable conclusion by studying data on Chinese adoption and Israeli kibbutzim.

In prerevolutionary China, "it had long been customary for poor families to give away infant daughters to be adopted in better off families. The infant girl would then be married to a son of the adoptive family, the marriage being consummated when the children reached puberty."[470] Surprisingly, however, in a vast majority of the cases studied, the prospective husband and wife refused to have sex "despite parental pressure

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[469] Ibid., 485.

[470] Pierre van den Berghe, *Human Family Systems: An Evolutionary View* (New York: Elsevier, 1979), 79.

that they should." It seems that there is in fact a biological predisposition toward avoiding sexual intercourse with people who grew up with you because throughout the vast majority of history they would have been your brother or sister. A similar phenomenon occurred in Israeli kibbutzim, where from the 1920s to the 1970s young children were raised communally. Although there was no cultural pressure to marry outside one's childhood home, van den Berghe "discovered that out of a total of 2,769 marriages involving kibbutzniks, only fourteen came from the same kibbutz small group. A closer examination of these fourteen exceptions revealed that in only five of those cases had the spouses been raised together before the age of six, and then never for longer than two of these six years of early childhood."[471] Sociobiology's evolutionary perspective had enabled van den Berghe to make sense of these previously unexplainable aversions to sexual intercourse in specific cultural contexts.

A "big-picture" thinker who resisted intellectual specialization, van den Bergh proceeded to study a broad range of human behavior that had never been analyzed from an evolutionary perspective. Race and ethnicity, in particular, drew his attention due to their importance in the modern world. The fact that they were extremely sensitive subjects did not deter him in the slightest, as he was confident in the power of sociobiological analysis and resentful of the pernicious effect political correctness had begun to have on intellectual inquiry. In *The Ethnic Phenomenon,* van den Berghe investigated the evolutionary origins of ethnicity and why it has continued to play such an important role in diverse societies. Previously, "social scientists of both right and left believed that ethnic sentiments would become increasingly vestigial, and that

[471] Ibid., 80.

"modernity" would engulf petty particularism, giving rise to ever wider and more rational bases of solidarity."[472] This, however, had not come to pass, as ethnicity continued to play a vital role in a person's identity despite increasing globalization.

The persistence of ethnicity baffled social scientists who assumed that ethnic identity resulted from a preindustrial cultural context and that it would simply lose meaning when individuals lived in new, more cosmopolitan settings. Van den Berghe, however, did not make that assumption. Viewing the subject from a sociobiology lens, he concluded that ethnicity was the result of an inherited predisposition to identify with those who resembled you in some way. The same could be said for the seemingly intractable issue of racism. According to van den Berghe, human beings had evolved almost entirely in small groups of extended kin networks that competed with other, rival groups of humans. In this setting, the genes that experienced the greatest reproductive success were found in humans who gave preferential treatment to others who looked like them or shared similar customs because those people were typically relatives. In essence, "ethnocentrism and racism are thus extended forms of nepotism—the propensity to favor kin over nonkin."[473]

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[472] Pierre van den Berghe, *The Ethnic Phenomenon* (New York: Elsevier, 1981), 16.

[473] Van den Berghe's argument for an innate human desire to join groups is pretty convincing when you consider the millions of football fans across the country who fill stadiums every Sunday, wearing team jerseys and passionately rooting for their "home" team. Of course, cheering for one group of strangers to defeat another group of strangers is an odd way to spend a weekend, but it makes perfect sense when one realizes that this type of abstract affiliation serves as an emotional proxy for the ancestral longing to support our kin network. Put this way, being a sports fan is not so much irrational as it is an out of place emotional expression. As van den Berghe explains, humans "evolved the kind of brain to deal with small-scale, Gemeinshschaft-type groups…who think of each other as an extended family." Thus, the Gesellschaft that we find ourselves in today is an

Not surprisingly, van den Berghe's speculations on the biological basis of prejudice upset some of his colleagues. Sharlotte Neely Williams cited "the recent decision by the American Anthropological Association to condemn theories of racial, sexual, and class inferiority" to support her condemnation of his work.[474] At the University of Washington, "a chorus of minority organizations, led by the vice-president for minority affairs, demanded that (he) be sacked for being a racist."[475] Then, after he had begun to incorporate gender into his sociobiological analysis, the Women's Caucus demanded that he be prevented from teaching his material. After suffering through these repeated attacks on his reputation the sociology department "tried to block (his) promotion to full professor" and van den Berghe was only able to earn tenure thanks to the intervention of the College Council.[476] As if that wasn't enough, in 1978 van den Berghe "achieved instant world notoriety" when a conservative senator sarcastically awarded him the Golden Fleece Award for extravagant government spending (apparently the senator thought his research grant was a waste of money because it involved

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unnatural environment, one where support for sports teams has replaced support for a family's collective, competitive endeavors. And sports are not the only artificial expression of kin network loyalty. Nationalism often draws on many of the same themes. Japan, for example, has a national myth of a common ancestor, which makes them all family. Closer to home, think of the Founding "Fathers" and the pride felt for the "Motherland."

[474] Sharlotte Neely Williams, "The Argument Against the Physiological Determination of Female Roles," *American Anthropologist* 75 (1973), 1725.

[475] Van den Berghe, "From the Popocatepetl to the Limpopo," 426.

[476] Ibid., 423.

interviewing strippers in Cusco, Peru).[477]

Van den Berghe refused to take the criticism lying down. Sociology's taboo against evolutionary thinking was misguided, he claimed, because "the degree to which our behavior is biologically determined is a perfectly good empirical question, and it is silly to banish the question from our scientific discourse because it displeases certain interest groups."[478] Even if academia accepted the premise that all research should share the same political values, there is no reason to assume sociobiology is intrinsically opposed to Progressive politics. In fact, according to van den Berghe, "sociobiology could be seen as revolutionary by stressing how fundamentally alike humans are beneath their cultural differences."[479] Anthropology had already begun to incorporate evolutionary thinking, and as a result the "social scientists who have anything intelligent to say about human ecology are overwhelmingly anthropologists."[480] If sociology wanted to remain relevant, it, too, would have to "abandon the dogma that man is purely a product of his upbringing and culture."[481]

Van den Berghe's attempts to align sociology with the natural sciences achieved mixed results. Some of his colleagues welcomed the evolutionary perspective as a new

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[477] Ibid., 429.

[478] Pierre van den Berghe, "A Reply to Sharlotte Neely Williams," *American Anthropologist* 76, no. 3 (September, 1974), 567.

[479] Pierre van den Berghe, "Sociobiology, Dogma, and Ethics," *The Wilson Quarterly*, Vol. 1, No. 4 (Summer, 1977), 123.

[480] Pierre van den Berghe, "Two Comments on 'A Reorientation of Niche Theory in Human Ecology,'" *Sociological Perspectives* 29, no. 3 (July, 1986), 421.

[481] Van den Berghe, "Sociobiology, Dogma, and Ethics," 126.

lens for analysis while others continued to reject what they saw as antiquated, reductionist thinking. He was undeniably successful, however, in sharing his views with a young psychology professor named David Barash. Born in 1946 to Eastern European immigrants and raised on Long Island when it was still rural, Barash earned his PhD at the University of Wisconsin. His dissertation was on the behavior of marmots. Therefore, Barash admits, when the University of Washington hired him, they expected him to research "animal (and) not human behavior."[482] What nobody could have predicted at the time was that Barash would become one of sociobiology's early leaders.

As a graduate student, Barash became fascinated with the idea "that behavior—even complex social behavior—has evolved and is therefore adaptive."[483] His efforts to better understand adaptive behavior led him to marmots, a social rodent that lives in diverse habitats around the world. He chose to study marmots because "they are diurnal, large enough to be easily seen, and relatively insensitive to the presence of a human observer."[484] Over the course of three thousand hours in the field, Barash was eventually able to discern "an exciting series of consistent and predictable correlations between marmot environments and social systems that indicate the ways in which social behavior may be adjusted to local ecology."[485] Different species of marmots, it seemed, had evolved behaviors best suited for their own habitats.

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[482] Barash, personal correspondence.

[483] David Barash, "Behavior as Evolutionary Strategy," *Science* 1, no. 4219 (Dec, 1975), 1084.

[484] David Barash, "The Evolution of Marmot Societies: A General Theory," *Science* 185, no. 4149 (Aug, 1974), 415.

[485] Barash, "Behavior as Evolutionary Strategy," 415.

One particular behavior that caught Barash's attention was the alarm call given to alert others of a nearby predator, so, a few years later, he attempted to make sense of the seemingly suicidal phenomenon in "Marmot Alarm-Calling and the Question of Altruistic Behavior."[486] To many biologists, alarm calling seemed inconsistent with natural selection because such daring could not possibly lead to increased reproduction; however, Barash had attended the 1972 annual meeting of the American Association for the Advancement of Science and experienced an "epiphany" listening to Robert Trivers.[487] As a result, he was prepared to make sense of paradoxical behaviors by viewing them as expressions of kin selection or reciprocal altruism. Thus armed with the tools of sociobiology, Barash discovered that alarm calling is in fact evolutionarily adaptive because the caller is usually an older male and "in a polygamous social system the adult male has a closer genetic affinity to, and hence a greater evolutionary interest in, the survival of the other colony members."[488]

Flush with excitement over the possibilities of sociobiology, Barash wanted to test out more hypotheses. If behavior truly is adaptive, he speculated, then "behavioral predispositions to minimize the chances of being cuckolded would be strongly selected among males," as the devastating cost of raising another's offspring would simply be too much to bear in a competitive reproductive environment.[489] Further, "This tendency

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[486] David Barash, "Marmot Alarm-Calling and the Question of Altruistic Behavior," *The American Midland Naturalist* 94, no. 2 (Oct, 1975).

[487] Barash, personal correspondence.

[488] David Barash, "Marmot Alarm-Calling and the Question of Altruistic Behavior," *The American Midland Naturalist* 94, no. 2 (Oct, 1975), 468.

[489] David Barash, "Some Evolutionary Aspects of Parental Behavior in Animals

would be especially strong among monogamous species" since males commit far greater resources in these circumstances.[490] To test this theory, Barash studied mountain bluebirds (*Sialia currocoides*) on Mt. Rainier in 1974. He chose birds because "In contrast to mammals, almost all birds are monogamous… due to the nestlings' high metabolic demands."[491]

The experiment was quite simple. Barash built wooden replicas of male bluebirds and placed them in the vicinity of females when the males left the nest to forage. Then he just waited for the males to return and observed their response. "Predictably," Barash wrote, "when the model was presented early in the breeding season, at the time copulation normally occurs, the resident male directed considerable aggression toward it."[492] Unexpectedly, the aggression was not only directed toward the model. In "Male Response to Apparent Female Adultery in the Mountain Bluebird," Barash addresses a dark side of male insecurity toward paternal uncertainty: "On the second day of model exposure, the resident male at nest 1 pulled an undetermined number of primary feathers out of his mate's wing. Two days later, this female was replaced by another female."[493]

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and Man," *The American Journal of Psychology* 89, no. 2 (June, 1976), 196.

[490] Barash, "Some Evolutionary Aspects of Parental Behavior in Animals and Man," 197.

[491] Ibid., 207.

[492] Ibid., 197.

[493] David Barash, "Male Response to Apparent Female Adultery in the Mountain Bluebird (Sialia currocoides): An Evolutionary Interpretation," *The American Naturalist* 110, no. 976 (Nov, 1976), 1098-1099.

For lack of a better word, he had discovered domestic abuse in the natural world.

The possibilities for sociobiological speculation were endless, as time and again Barash found evolutionary explanations for previously inexplicable animal behavior. He discovered that birds, for instance, are decidedly not blank slates when it comes to communication. If they were blank slates, they could learn any bird song with enough exposure, but in experiments "without any previous experience in this regard, the young bird chooses the song that is appropriate for its species and selectively learns that one rather than another."[494] Also, infant rhesus monkeys raised in captivity "who have never seen a dominant male will nonetheless instinctively present subordinate behavior" when shown video of an aggressive alpha monkey.[495] If they had to be taught how to respond through cultural education alone, this reaction would not be possible. And how could one make sense of the fact that "adult zebras defend calves against predators, whereas wildebeests do not" unless one took into consideration that "zebras live in coherent family groups whereas wildebeest herds experience substantial mixing of genetic lineages, making it unlikely that an adult is related to an randomly chosen calf."[496]

Barash's exposure to sociobiology clearly had a profound effect on his views of animals. It was as if, he explains, "you have been seriously nearsighted all your life but haven't been aware of it until your are fitted for eyeglasses. Things seen only dimly, if at

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[494] David Barash, *Sociobiology and Behavior* (New York: Elsevier, 1977), 40.

[495] Ibid., 129.

[496] Ibid., 89.

all, are suddenly clear."[497] As previously mentioned, the conversion to sociobiology began when he first heard Dr. Trivers speak, an experience he can vividly recall almost forty years later: "I've known Bob Trivers since the early 1970s, and perceived immediately that his ideas (not just on reciprocity, but on parental investment theory and parent-offspring conflict) were original and very important. In all three cases, I found myself echoing Thomas Huxley's supposed response upon reading *The Origin of Species*: how stupid of me not to have thought of that!"[498] In addition to Trivers, Barash learned from the work of Richard Alexander, Napoleon Chagnon, Sarah Hrdy, and Martin Daly. Of all the people who influenced him, however, van den Berghe had the biggest impact. Barash recalls, "It wasn't until I was hired by the psychology department at the University of Washington that I began to think seriously about the prospects of pushing an evolutionary perspective on human behavior."[499]

Barash met Pierre van den Berghe shortly after joining the faculty at the University of Washington and before long the senior sociologist had facilitated the young professor's transition to human sociobiology. According to Barash "Pierre was probably the most important" influence on him because their proximity allowed for friendly conversations and professional collaboration.[500] As a result, Barash made his first foray into human sociobiology in 1977 with van den Berghe as the co-author of an article titled

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[497] David Barash, "The New Synthesis," *The Wilson Quarterly* 1, no.4 (Summer, 1977), 119.

[498] Barash, personal correspondence.

[499] Barash, personal correspondence.

[500] Barash, personal correspondence.

"Inclusive Fitness and Human Family Structure." In the article, the two of them argued that "kin selection theory provides a parsimonious way of accounting for nepotism."[501] From then on, Barash dealt almost exclusively with humans. In *Sociobiology and Behavior*, for example, he addressed the sexual double standard that exists between men and women. While radicals and feminists believed the hypocrisy to be rooted in Victorian mores, Barash claimed, "the high parental investment required of women compared with that of men" naturally leads to a binary of acceptable reproductive strategies: frequent copulations for men and discerning choice for women.[502] Similarly, Barash argued, "Men are rarely prostitutes"… because sperm is cheap and eggs are expensive," and not because women have been objectified by a patriarchal society.[503]

The general theme in Barash's writing is that "our potential as human beings is undeniably very great, but it isn't infinite."[504] Just as "an ocelot has ocelot nature, we have human nature. We are, perhaps, the most flexible animals in the world, but to be human is still something distinctive, and evolution offers us a look at what that something may be."[505] Therefore, we should be mindful of the potential difficulty in establishing government policies or social norms that contradict our biological predispositions. This is not to say that we are slaves to a fixed human nature, far from it, but it is important to

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[501] David Barash and Pierre van den Berghe, "Inclusive Fitness and Human Family Structure," *American Anthropologist* 79, no. 4 (Dec, 1977), 815.

[502] Barash, *Sociobiology and Behavior,* 293.

[503] Ibid., 283.

[504] David Barash, *The Whisperings Within* (New York: Harper & Row Publishing, 1979), 1.

[505] Ibid., 7

know what challenges lie ahead in order to set and achieve social objectives. Take racism as an example. Most thoughtful people agree that it is hurtful to both the individuals affected and society as a whole, yet "blank slate" thinkers mistakenly claim that "nobody is born a bigot," which implies that there is no education necessary to create a postracial society. "If sociobiology is correct," Barash claimed, "we've got to be carefully taught *not* to hate others who are different from ourselves, because it may be our biological predisposition to do so."[506] The same lesson holds for efforts to remove gender norms. While a worthwhile endeavor to consider, those committed to establishing a society that ignores gender should know what they are up against. Barash argued, "In all human societies there is a clear asymmetry (between) gender roles" because of very real physiological and behavioral adaptations; therefore, a better path forward might be to value these differences rather than fight against them.[507]

In the end, Barash claimed, "much of the discordance in human existence may be due to the discordance between our biology and our culture."[508] The struggles of the modern nuclear family, for example, exist largely because humans evolved in large extended kin networks. Thus, today's parents are in the impossible position to fulfill all of the roles that numerous friends and family had played in the past. The current obesity epidemic is another example. Humans evolved a "sweet tooth" in a context of calorie deficiency; however, we no longer live in that environment, turning what was originally

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[506] Ibid., 154.

[507] David Barash and Pierre van den Berghe, "Inclusive Fitness and Human Family Structure," 813.

[508] David Barash, *The Tortoise and the Hare: Culture, Biology, and Human Nature* (New York: Viking Press, 1986), 44.

an adaptive longing into an obstacle to health for millions of people. The juxtaposition of these two examples demonstrates the flexibility of Barash's sociobiology. With regard to families, he believes people should listen to their biological predispositions and raise their children in more inclusive environments, but he certainly does not advocate eating a diet high in sugar simply because our bodies have evolved that preference. Each situation must be analyzed separately, taking into consideration humans' evolutionary past without abandoning contemporary values. In his own words, "evolution is a wonderful thing to learn *about*, but a terrible thing to learn *from*."[509]

Unfortunately for Barash, not everybody saw things the same way.[510] As a pioneer in sociobiological psychology he was on the front lines of the battle for evolutionary thinking's return to the social sciences. When activists threw water at E.O. Wilson, he "was seated right next to Ed at the speaker's table, and even was mildly dampened by some the water in question!"[511] When he and Pierre van den Berghe published "Inclusive Fitness and Human Family Structure" they met considerable resistance from both academics and activists. In their reply to several critical reviews, van den Berghe and Barash noted that "our article is already under ideological fire by a group calling itself the Committee Against Racism."[512] The vitriol, however, did not deter them:

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[509] Barash, personal correspondence.

[510] Phrases such as "it is perfectly good biology that business and profession taste sweeter to (men), while home and child care taste sweeter to women" did not help. Barash, *The Whisperings Within,* 114.

[511] Barash, personal correspondence.

[512] David Barash and Pierre van den Berghe, "Reply to Dickeman, Graham, Martin, Smith, and Walter," *American Anthropologist* 81, no. 2 (June, 1979), 365.

"We are more amused than alarmed by such attacks, which, of course, do nothing to detract from the empirical validity of our statements."[513] By this time in his career, Barash was comfortable in his sociobiological skin and looked forward to the challenges ahead. When asked about the difficulty of introducing evolution to his discipline, he responded "I was very much aware of being a pioneer, both in introducing more direct and dynamic use of evolutionary principles into ethology and in introducing them into the social sciences. If anything, I was attracted by being involved in ushering in a new paradigm."[514]

Barash was well aware that many people resisted sociobiology. In "Behavior as Evolutionary Strategy" he acknowledged, "psychologists and sociologists particularly may find this new approach confusing and distasteful."[515] But he was convinced that the "critics who accuse sociobiology of genetic determinism unfairly oversimplified the issue, since the claim for evolution's relevancy to behavior rests on genetic influence, not determinism," and he was determined to help the social sciences leave behind its rickety theoretical edifice for one grounded in the biology.[516] By legitimizing so many schools of thought, the social sciences had created an incoherent mix of "Durkheimians, Weberians, Marxists, Freudians, Adlerians, Jungians, Piagetians, and Skinnerians," none of whom believed evolution had influenced culture.[517]

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[513] Ibid.

[514] Barash, personal correspondence.

[515] David Barash, "Behavior as Evolutionary Strategy," 1085.

[516] Barash, "The New Synthesis," 118.

[517] Ibid.

Barash thought, correctly, that sociologists and anthropologists had created the taboo against evolutionary thinking as a corrective measure for their disciplines' earlier acceptance of Social Darwinism, and that "they did penance for their sins by proclaiming that human beings enjoy absolutely unlimited behavioral potential as tabula rasa upon which experience can write as it will."[518] As a result, most social scientists who trained after World War II feared the potential for genetic determinism in evolutionary thinking. Sociobiologists, however, had no desire to advocate for the inevitability—or even superiority—of nature over nurture. "Behavior is not," he assured, "somehow encapsulated within genes, waiting to spring fully armed like Athena from the head of Zeus."[519] Further, not everything "natural" needs to be accepted. For goodness sakes, he exclaimed, "male rabbits court females by urinating on them."[520] That does not make the practice something to emulate! According to Barash, the criticisms of sociobiology were not legitimate, as they came from misunderstanding and misplaced fears. When asked about the critics' opinions, many of whom were communists and feminists, Barash candidly admitted, "despite the fact that my own political leanings were then, and still are very far to the left, my perspective was that they ate shit!"[521]

Like other sociobiologists, Barash shared many of his critics' political

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[518] Barash, *Sociobiology and Behavior*, 7.

[519] Barash, "Behavior as Evolutionary Strategy," 1085.

[520] Barash, *The Whisperings Within*, 2.

[521] Barash, personal correspondence.

convictions; therefore, he strove to conduct research that could serve as a counter-example to those who remained convinced that evolutionary thinking was inherently reactionary. Nuclear war, or, more precisely, the movement to stop it, provided Barash with this opportunity, and he wrote prolifically on the subject for many years. In *The Caveman and the Bomb*, he argued that human beings have a "Neanderthal mentality" that was adaptive in the Stone Age but is no longer appropriate for the challenges of the modern world.[522] "It is quite difficult," he explained, "for a naked, untrained human being to kill another," so our ancestors had less need to restrain their attacks.[523] As a result, we did not evolve the same inhibitions to violence as more dangerous animals did, which left us vulnerable to unfathomably violent acts such as dropping nuclear bombs. In addition, Barash claimed, nuclear war is too abstract to engender empathy. Human beings evolved an aversion to causing suffering in a face-to-face context and the triggers to this emotion (e.g., crying, blood, screams) are largely absent in nuclear warfare. "The same man," Barash explained, "who can coolly plan for twenty million 'acceptable casualties' in a 'limited' nuclear war would doubtless be appalled by a single gunshot."[524] For this reason, Barash supported the idea, presumably more in theory than in practice, of placing the codes to launch a nuclear missile within the living body of another person. That way

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[522] David Barash, *The Caveman and the Bomb: Human Nature, Evolution, and Nuclear War* (New York: McGraw-Hill Book Company, 1985), x. Of course, one need not have arrived at this conclusion from an evolutionary point of view. Albert Einstein said basically the same thing during the Cold War: "The unleashed power of the atom has changed everything save our modes of thinking, and thus we drift toward unparalleled catastrophe."

[523] Barash, *The Whisperings Within*, 184.

[524] David Barash, *The Caveman and the Bomb*, 42.

the president would have to truly experience her natural biological repulsion to violence before ordering the deaths of millions.

Barash also proposed electing women into positions of power to mitigate the discrepancy between our Neanderthal mentality and our dangerous technological capabilities.[525] Hamilton had shown that all humans evolved a sense of in-group amity and out-group enmity due to kin selectionism. For this reason, "the biological roots of militant nationalism are consistent with the many evolutionary survival advantageous to an individual belonging to a group."[526] Put more crassly, "if religion is the opiate of the masses, nationalist propaganda is the cocaine."[527] There was hope, however, in the biological distinctions between genders. According to Barash, "mentality might be different than 'womentality' because men are naturally more aggressive due to their much higher variation in reproductive success.[528] Thus, "sperm bearers tend to be spear-bearers," and it might be in our best interest to separate this aggression from weapons capable of genocide.[529]

The possibility of nuclear war worried a lot of people in the late 1970s and early 80s, as the Cold War heightened anxieties for an entire generation of people who felt, rightfully so, that a war of unprecedented destruction was only one misstep away from

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[525] This conclusion is a perfect example of Barash's efforts to both postulate novel, important psychological insights and to demonstrate evolution's compatibility with liberal values.

[526] David Barash, *The Caveman and the Bomb,* ix.

[527] Ibid., 138.

[528] Ibid., 15.

[529] Ibid., 17.

becoming a frightening reality. Political scientists of the era responded to the tenuous peace in one of two ways. Either they wanted to "win" the conflict or they wanted to defuse it. In general, those who sought a unilateral victory, men such as Henry Kissinger, held pessimistic views of human nature and the prospects for genuine peace. They believed a pragmatic, if not ruthless, advancement of one's own interests was the best strategy to achieve a global order through economic and military dominance. Others hoped to find the means to cooperation among equal nations. Attempts to dominate others, they reasoned, could easily lead to tragedy when all of the parties involved have nuclear bombs.

Unfortunately for the pacifists, classical political theory did not support their views. Heavily influenced by the Enlightenment, the discipline had largely accepted the premise that authority was the price of peace. Here is the cynical eighteenth-century philosopher Thomas Hobbes in his classic, *Leviathan,* "There must be some coercive power to compel men equally to the performance of their covenants by the terror of some punishment greater than the benefit they expect by the breach of their covenant."[530] Hobbes thought a king was best suited to keep order but the appeal to authority need not result in deference to royalty. Another titan of the Enlightenment, Jean Jacques Rousseau, also advocated the suppression of individual interests for the common good, but he advocated subordination to the "general will" of the people. "In order that the social contract may not be an empty formula," he writes in *The Social Contract,* "it tacitly includes the undertaking, which alone can give force to the rest, that whoever refuses to

[530] Thomas Hobbes, *Leviathan Or the Matter Form and Power of a Commonwealth, Ecclesiastical and Civil* (London: George Routledge and Sons, 1886), 72.

obey the general will shall be compelled to do so by the whole body. This means nothing less than that he will be forced to be free."[531]

Robert Axelrod is a professor of political science at the University of Michigan and he was one of those who sought genuine peace. He rejected classical political theory's reliance on authority because he believed it did not solve the complex problems nations faced in the twentieth century. For both Hobbes and Rousseau, authority functioned due to its ability to punish the offender; however, in an interdependent global economy that relies on free trade, punitive measures often negatively affect both parties. Militarily speaking, an invasion could now be met with nuclear weapons (clearly bad for everyone involved), and economic punishment was problematic. The mercantilism of the Enlightenment Era was a zero-sum contest, so hoarding gold or blocking trade from a weaker rival made sense, but capitalism needs growth to survive, making cooperation essential to even the most powerful nations.

Axelrod argued that the central problem for modern political scientists, then, was to figure out how to foster cooperation in a competitive environment. "A good example" of this fundamental problem "is the case where two industrial nations have erected trade barriers to each other's exports. Because of the mutual advantages of free trade, both countries would be better off if these barriers were eliminated. But if either country were to unilaterally eliminate its barriers, it would find itself facing terms of trade that hurt its own economy."[532] According to Axelrod, Hobbes had "built his justification of the state

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[531] Jean Jacques Rousseau, *The Social Contract* (London: Cosimo, 2008), 27.

[532] Robert Axelrod, *The Evolution of Cooperation* (New York: Basic Books, Inc., 1984).

upon the purported impossibility of sustained cooperation in such a situation," yet he believed he might have found a solution.[533] Influenced by a visiting scholar, the seemingly ubiquitous William Hamilton, Axelrod had turned to evolutionary theory and subsequently discovered "a demonstration that mutual cooperation could emerge among rational egoists."[534] He hoped that this discovery "would provide a powerful argument that the role of the state should not be as universal as some have argued."[535] In other words, he hoped to transform his discipline.

Axelrod "was fascinated by Darwinian evolution" for almost as long as he could remember.[536] In high school, his project "Hypothetical Life Forms and Environments by Computer Simulation" won him a college scholarship and a trip to Washington D.C. to meet President Kennedy.[537] As an undergraduate at the University of Chicago, he "studied evolution in more depth" with the Committee on Mathematical Biology.[538] And when he began his doctorate, he "always kept evolutionary thinking in mind."[539] Therefore, it comes as no surprise that Axelrod formed a personal and professional relationship with William Hamilton when the British evolutionary biologist accepted a

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[533] Robert Axelrod, "The Emergence of Cooperation among Egoists," *The American Political Science Review*, Vol. 75, No. 2 (June, 1981), 307.

[534] Ibid.

[535] Ibid.

[536] Axelrod, personal correspondence.

[537] Axelrod, personal correspondence.

[538] Axelrod, personal correspondence.

[539] Axelrod, personal correspondence.

position as a visiting scholar at the University of Michigan. The two men were both fascinated with altruism, especially in circumstances where their colleagues agreed it should not exist. For Hamilton, this meant in nature, and for Axelrod this meant among competing political entities. Both settings were purportedly governed by selfish interests that left everyone involved "red in tooth and claw," yet Hamilton and Trivers had recently discovered the mechanisms for altruistic behavior in nature. Was it possible to engender cooperation in the callous world of international politics?

Axelrod's seminal work, *The Evolution of Cooperation*, is an attempt to answer that question. It begins by elaborating the logic for "an evolutionary approach" rather than classical political science methodology and then grounds the reader in the relevant evolutionary biology research.[540] "The theory of biological evolution," Axelrod explains, "is based on the struggle for life and the survival of the fittest. Yet cooperation is common between members of the same species and even between members of different species."[541] To account for this altruism, "evolutionary theory has recently acquired two kinds of extensions. These extensions are, broadly, genetical kinship theory and reciprocity theory."[542] By taking these factors into consideration, one can make sense of a wide array of sacrifice and symbiosis among animals and human beings. "The problem is," Axelrod continues, "that while an individual can benefit from mutual cooperation, each one can also do even better by exploiting the cooperative efforts of others."[543] In

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[540] Axelrod, *The Evolution of Cooperation*, 56.

[541] Ibid., 89.

[542] Ibid., 89.

[543] Ibid., 92.

political scenarios rife with self-serving advocates of *realpolitik*, it goes almost without saying that at least one party would choose to exploit the other, thus eliminating the mutual benefits of cooperation.

Apparently, the limits of cooperation had been reached. One could reasonably expect the other to "play nice" when they happen to be your friend or part of your family, but, according to evolutionary biology, the incentive to take advantage of the other's kindness will lead to selfish behavior when the parties involved have competing agendas. Here, where others saw an impasse, Axelrod saw an opportunity. He knew what the theory said, but he also knew of examples in history when antagonists had cooperated for their mutual benefit. Combatants in trench warfare during World War I, for example, developed "live-and-let-live" systems to help ease their otherwise terrible circumstances.[544] As unbelievable as it sounds, these men (who were sent to the front line explicitly to kill the other) frequently arranged safe times and locations, as well as a prohibition against destroying incoming rations. Axelrod took this phenomenon as proof that "friendship is hardly necessary for cooperation."[545] Similarly, Axelrod pointed out, members of the United States Congress frequently engage in mutually rewarding behavior, colloquially known as "horse trading," with their political rivals. The practice has become so common that insiders claim "it is not an exaggeration to say that

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[544] Ibid., 73.

[545] Axelrod, "The Emergence of Cooperation among Egoists," 307.

reciprocity is a way of life in the Senate."[546]

To understand how cooperation emerged in these hostile environments, Axelrod needed a new approach, so he developed "agent-based modeling."[547] This method utilizes computer programs to simulate the actions of autonomous agents in "games" that mimic real life. The game that he chose to analyze was the Prisoner's Dilemma. "In the Prisoner's Dilemma game," Axelrod explains, "two accomplices to a crime are arrested and questioned separately. Either can defect against the other by confessing and hoping for a lighter sentence. But if both confess, their confessions are not as valuable. On the other hand, if both cooperate with each other by refusing to confess, the district attorney can only convict them on a minor charge."[548] Although the Prisoner's Dilemma deals with criminals and prison sentences, the basic premise is the same as the political scenarios Axelrod studied. If he could discover a way to engender cooperation among agents in this game he could use that knowledge to support peace in the real world.

The first step in his analysis was to invite "experts in game theory to submit programs for a Computer Prisoner's Dilemma Tournament—much like a computer chess tournament."[549] After over two hundred rounds of competition, "the winner was the simplest of all the programs submitted, Tit-for-Tat. Tit-for-Tat is merely the strategy of starting with cooperation, and thereafter doing what the other player did on the previous

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[546] Donald Matthews, quoted in Axelrod's *The Evolution of Cooperation*, 5.

[547] Axelrod describes agent-based modeling as a "third way of doing science (in addition to the standard methods of deduction and induction)."

[548] Axelrod, *The Evolution of Cooperation*, 125.

[549] Ibid., vii.

move."[550] Afterwards, Axelrod invited even more people to participate in another tournament, but, again, Tit-for-Tat won. The implications were profound; cooperation, appeared, was not only possible, it was the best strategy. What made this possible, Axelrod theorized, were the repeated iterations of the game during the course of the tournament. Each participant could still deceive the other and enjoy a disproportionate benefit, *but this only worked once*. Over the long haul, Tit-for-Tat succeeded because it developed trust with the other and thus fostered cooperation, which benefitted both parties.

The *Evolution of Cooperation* had a tremendous impact on both evolutionary biology and the social sciences. Biologists took note because The Prisoner's Dilemma "simulates the survival of the fittest."[551] Therefore, Axelrod immediately "collaborated with a biologist (William Hamilton, of course) to develop the biological implications of these strategic ideas."[552] For one, "the simplicity and robustness of the Tit-for-Tat strategy strongly support(ed) individual level selection."[553] In a larger sense, it could be argued that Axelrod had contributed the third and final chapter to the evolutionary logic of cooperation. Before him, Hamilton had demonstrated altruism among kin, then Trivers had shown how reciprocal altruism operated among friends, and now he had proven it could thrive even among antagonists. Using, "an evolutionary approach," as Axelrod did,

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[550] Ibid., vii.

[551] Ibid., 50.

[552] Ibid., ix.

[553] Donald Campbell, "The Agenda Beyond Axelrod's The Evolution of Cooperation," *Political Psychology* 7, no. 4 (December, 1986), 794.

it was now possible to speculate on the biological origins of human beings' almost pathological "concern for reputation."[554] Being known as a good person—and knowing who not to trust—played a critical role in our ancestors' reproductive success and our inherited, nearly insatiable interest in these matters can be seen in the scandalous personal content found in newspapers and television shows around the world.

Of course, some people took umbrage with Axelrod's work. When asked about the critics, he responded, "I thought they had gone too far."[555] Yes, he had "always been supportive of the themes of sociobiology."[556] And "yes," he was "aware of being a pioneer in the reintroduction of evolutionary thinking" in political science.[557] However, the resistance he encountered frustrated Axelrod, for he had gone out of his way to make clear that his work did not advocate genetic determinism. He recalls, "I ran into a problem in 1982. Working with Sandra Scarr we submitted an outline to *Scientific American*. The editor encouraged us to submit the article, which we did: 'Human Intelligence and Public Policy.' When I enquired after about four months whether it would be accepted, the editor wrote back that the publisher didn't want to have anything to do with something related to genetic aspects of human intelligence—even though we cited Scarr's work with twins reared apart that showed there was no difference in mean

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[554] Robert Axelrod, "An Evolutionary Approach to Norms," *The American Political Science Review* 80, no. 4 (December, 1986), 1107.

[555] Axelrod, personal correspondence.

[556] Axelrod, personal correspondence.

[557] Axelrod, personal correspondence.

IQ between U.S whites and blacks."[558] Apparently, despite the authors' unequivocal stance on racial equality, the journal felt the content, if not the argument, was too reminiscent of the racist biological analyses of the early twentieth-century.

Ultimately, Axelrod remained undeterred by his detractors, as the very real threat of nuclear war loomed much larger for him than threats to his professional reputation. Years later, he described the pragmatic concerns that inspired his work: "*The Evolution of Cooperation*, with its focus on Prisoner's Dilemma, was written during the Cold War. Indeed, one of its primary motivations was to help promote cooperation between the two sides of a bipolar world. My hope was that a deeper understanding of the conditions that promote cooperation would make the world a little safer."[559] To this end he was successful. He had discovered that, in order to circumvent the incentive to deceive the other, it was necessary to "enlarge the shadow of the future."[560] Otherwise, one or both parties will logically refuse to cooperate in circumstances that mirror the Prisoner's Dilemma. One "way to enlarge the shadow of the future is to make the interactions more frequent."[561] Knowing you will engage with the other party again introduces personal reputation into the equation and incentivizes cooperation due to the prospect of continued benefits. "This is why," Axelrod argues, "cooperation emerges more readily in small

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[558] Axelrod, personal correspondence.

[559] Robert Axelrod, *The Complexity of Cooperation: Agent-Based Models of Competition and Collaboration* (Princeton: Princeton University Press, 1997).

[560] Axelrod, *The Evolution of Cooperation*, 126.

[561] Ibid., 129.

towns than in large cities."[562] For governments engaged in protracted negotiations, "another way to make interactions more frequent is to break down the issue into small pieces. An arms control or disarmament treaty, for example, can be broken down into many stages."[563]

Axelrod had done it. Inspired by Hamilton and Trivers, he had taken an evolutionary approach to the problem of cooperation among competitors and he had discovered the mechanisms to make it work. Politicians and policy makers could now turn to his research for guidance in achieving peaceful outcomes when conflicts between nations developed into Prisoner's Dilemma's. But what about normal people? Could they use Tit-for-Tat to guide them in their lives? *Should* they? The strategy was undeniably successful, but that did not mean it was ethical. Yes, there were some admirable characteristics to the method. Those who follow Tit-for-Tat, for example, are not greedy; indeed, they cannot by definition do better than their adversary. Also, they always begin with cooperation, and this is some conciliation to those who strive to conduct themselves according to their highest standards. In addition to those positive traits, Tit-for-Tat helped people find mutually beneficial solutions to difficult problems. Surely this counts for something. Ethics, however, are complex. For some, the ends do not justify the means, so Tit-for-Tat's potential to achieve peaceful outcomes might not qualify the strategy as an ethical way of life for them. If one takes Axelrod's work as the third and final extension of kindness under natural selection, reasonable people could conclude that evolution is in fact a theory of selfishness because the kindness that it engenders ultimately serves to

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[562] Ibid., 130.

[563] Ibid., 131.

facilitate one's own reproductive success. At the time Axelrod was writing, professional philosophers did not have much to say on the matter. As far as they were concerned, any application of evolution to ethics had been discredited by Henry Sidgwick and G.E. Moore in the early twentieth-century.

E.O. Wilson begged to differ. In *Sociobiology*, he claimed that "scientists and humanists should consider together the possibility that the time has come for ethics to be removed temporarily from the hands of the philosophers."[564] For those who remained skeptical that biology could succeed where thousands of years of philosophical speculation had failed, Wilson metaphorically dissected a human body to reveal the roots of ethics in flesh and blood: "The hypothalamus and limbic system ... flood our consciousness with all the emotions - hate, love, guilt, fear, and others – that are consulted by ethical philosophers who wish to intuit the standards of good and evil. What, we are then compelled to ask, made the hypothalamus and the limbic system? They evolved by natural selection. That simple biological statement must be pursued to explain ethics."[565] Of course, most philosophers did not relinquish their authority immediately upon hearing Wilson's claims. Michael Ruse explains, "As might be expected, like everyone else we philosophers have genes for self-preservation (Socrates notwithstanding), and no doubt matters did not seem quite so clear-cut to us."[566] Some philosophers, such as Ruse himself, however, did come to believe that the recent

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[564] Wilson, *Sociobiology*, 563.

[565] Ibid., 3.

[566] Michael Ruse, *Sociobiology: Sense or Nonsense* (Boston: D. Reidel Publishing Company, 1984), 195.

developments in evolutionary biology warranted serious attention.

Born in Birmingham, England in 1940, Michael Ruse was raised in a very pious family. His father, William, worked as both a civil servant and school bursar while his mother taught at the local school. During World War I, William was a conscientious objector. After the war, the family became involved with the Society of Friends, otherwise known as the "Quakers," and subsequently Michael left home to study at a Quaker boarding school in York. These early experiences played an important role in Ruse's intellectual development, as he learned to think deeply about ethics. In 1962 he emigrated to Canada to earn a master's degree in philosophy at McMaster University before returning to Bristol to receive his PhD in 1970. At this time, Ruse, like most students of philosophy, felt evolution had no place in serious philosophical matters. In fact, he agreed that "evolutionary ethics is one of those subjects with a bad philosophical smell. Everybody knows that it has been the excuse for some of the worst kinds of fallacious arguments in the philosophical workbook, and in addition it has been used as support for socioeconomic policies of the most grotesque and hateful nature, all the way from cruel nineteenth-century capitalism to twentieth-century concentration camps."[567] Ruse's harsh perspective was commonplace among his colleagues, for he earned his doctorate during the heyday of "analytic philosophy," which had little patience for ethics in general, and no tolerance for evolutionary theories. Ludwig Wittgenstein, whose work inspired many of the leading analytic philosophers, once claimed that "Darwin's theory

[567] Michael Ruse, *Philosophy After Darwin* (Princeton: Princeton University Press, 2009), 489.

has no more relevance for philosophy than any other hypothesis in natural science."[568] And so it stood. At least until sociobiology began to threaten philosophy's domain.

"Evolutionary ethics continued on ice," Ruse explains, "and things did not start to thaw until the middle of the 1970s, with the development of sociobiology, and especially with the insistence of Edward O. Wilson that evolution is indeed relevant to ethics."[569] Most philosophers dismissed Wilson out of hand. Ruse, however, who had gained tenure at an obscure teaching college in Canada almost immediately after earning his doctorate, relished the opportunity to explore the science behind Wilson's controversial claims. As a Quaker, he was accustomed to being an ethical outsider, and, besides, he had just secured professional immunity–might as well enjoy it. What he discovered invigorated him: "My newfound enthusiasm is connected with exciting developments in modern evolutionary biology, especially that part which deals with social behavior."[570] Excitedly, he outlined the two primary scientific explanations of altruism to his colleagues. "First, there is so-called kin selection, the brainchild of the British biologist (then but a graduate student) William Hamilton. He pointed out that organisms that are related share copies of the same genes, and hence, inasmuch as one individual reproduces, it is also passing on copies of the genes of the relatives. Hence if one can get a relative to reproduce by giving it help, one is doing oneself a bit of genetic

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[568] Ludwig Wittgenstein, *Tractatus Logico-Philosophicus* (London: Routledge & Kegan Paul, 1923), 1122.

[569] Ruse, *Philosophy After Darwin*, 326.

[570] Ibid., 489.

good on the side."[571] Second, "there is reciprocal altruism…due to the American biologist Robert Trivers."[572] This is essentially "you scratch my back and I will scratch yours. It can hold between non-relatives and even between members of different species."[573] For the remainder of his career, Ruse would investigate and elaborate upon these basic principles. In 2014, he recalled, "it took me a few years to see how sociobiology could help our understanding of ethics – once that happened, everything fell into place and I have not changed my thinking much since then."[574]

Writing in the late 1970s and 1980s, Ruse benefitted from the trailblazing efforts of the social scientists before him who had already embraced sociobiology. Because of these men and women, he could learn from the applications of evolution to human behavior and not simply the evolutionary biology of Hamilton and Trivers. The quotations and citations in Ruse's writing reveal the profound influence these social scientists had on him. In *Darwinism Defended*, he praises Napoleon Chagnon's discovery "that power in a Yanomamo village translates into having more offspring than average."[575] He thanks Richard Alexander, whom he describes as "the one sociobiologist who has really tried to pin down the culture's of specific societies to genetic foundations" for "patiently listening to my half-formed ideas" in one of his earliest works,

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[571] Ibid., 327-328.

[572] Ibid., 328.

[573] Ibid., 328.

[574] Ruse, personal correspondence.

[575] Ruse, *Darwinism Defended: A Guide to the Evolution Controversies* (Reading: Addison-Wesley Publishing Company, 1982), 259.

Sociobiology: Sense or Nonsense?[576] Sarah Hrdy convinced him that human beings are not the only species with a moral capacity in *Taking Darwin Seriously* and, later in the same book, he describes David Barash as a "perceptive writer."[577] As a final example, to explain the evolutionary roots of moral codes, he cites van den Berghe's research on the incest taboo. "Consider," Ruse wrote in the journal *Philosophy*, "the avoidance of brother-sister incest…. the inhibition persists even when the pairs are biologically unrelated and encouraged to marry. Such a circumstance occurred, for example when children from different families were raised together in Israeli kibbutzim and in Chinese households practicing minor marriages."[578] If there were any lingering questions whether the sociobiologists had influenced Ruse, one need only look at the co-author of the *Philosophy* article: E.O. Wilson! Clearly, by the mid-1980s Ruse was "in the sociobiological camp fully" and ready to make his own contributions.[579]

The first step in Ruse's effort to reintroduce evolutionary thinking to philosophy was to address the elephant in the room, evolutionary ethics, for "almost without exception, professional philosophers have dismissed evolutionary ethics with brief contempt."[580] Ruse had to decide whether to challenge the condemnation of evolutionary ethics, to argue that his predecessors had been wrong, or to somehow differentiate his

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[576] Michael Ruse, *Sociobiology: Sense or Nonsense?,* 78, xi.

[577] Michael Ruse, *Taking Darwin Seriously: A Naturalistic Approach to Philosophy* (New York: Basil Blackwell, Ltd., 1986), 236.

[578] Michael Ruse and E.O. Wilson, "Moral Philosophy as Applied Science," *Philosophy*, Vol. 61, No. 236 (April, 1986), 184.

[579] Ruse, personal correspondence.

[580] Michael Ruse, *Darwinism Defended*, 268-289.

approach from those in the past. The answer was easy for Ruse, as he agreed that "it is fairly clear that the evolutionary ethics commits the naturalistic fallacy," and thus should remain abandoned.[581] "You cannot go from the course or fact of evolution to moral prescriptions" he argued, a fact made clear with even a cursory glance at the cruelty of nature.[582] "Take, for example, the smallpox virus," he writes. "This is a product of evolution: one which the World Health Organization is trying to eliminate. But, inasmuch as WHO is trying to eliminate smallpox, it is trying to frustrate the course of evolution. It is trying artificially to make one species extinct. Yet surely, no one would want to say that the actions of the members of the WHO are morally wrong, and that people (including ourselves!), should just be allowed to die from smallpox."[583] No, Ruse had no use for evolutionary ethics as commonly understood. Instead, he wanted to establish a new approach to combining biology with philosophy. He called it "Darwinian ethics."

In "Evolution and Ethics," Ruse introduces Darwinian ethics, claiming that "a major attraction to my position is that one simply cannot be guilty of committing the naturalistic fallacy or violating the is-ought barrier, because one is simply not in the justification business at all."[584] Ruse's confidence comes from the fact that Darwinian ethics does not even attempt to argue what is or is not moral. "A philosopher is not a preacher," he explains, "not even a moralist in the usual sense of the term. Whatever the

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[581] Ruse, *Sense or Nonsense?,* 200.

[582] Ruse, *Darwinism and its Discontents* (Cambridge: Cambridge University Press, 2008), 255.

[583] Ruse, *Sense or Nonsense?,* 202.

[584] Ruse, *Philosophy After Darwin*, 504.

value of moral exhortations may be, it is not in any straightforward way the job of the philosopher to spout forth as a font moral wisdom: 'Love your neighbor!' 'Abstain from sex!' 'Return your library books!'"[585] In Darwinian ethics, "the philosopher's intrinsic interests lie elsewhere. He/she is trying to understand the nature of morality, and the grounds which support it."[586] Therefore, "the genuine Darwinian need not fear the criticisms of traditional evolutionary ethics."[587]

Ruse's primary focus is to remove morality from the abstract, rational heavens and to plant it firmly in the dirt of evolutionary theory. To most philosophers, evolution is the cutthroat survival of the fittest; therefore, "it would seem *prima facie* that morality does not pay from an evolutionary perspective, and hence ought not to have evolved."[588] Thus, a change in the understanding of evolution was necessary for natural selection to become relevant to morality, which is cooperative if nothing else. The "'breakthrough,'" Ruse argued, "occurred when the then graduate student William Hamilton saw that social cooperation is possible—can indeed be a direct result of natural selection—so long as the individual giving aid benefits biologically."[589] As a result of the developments in evolutionary biology, ethics ceased to be a transcendent exception to biology requiring philosophical explanation and became just another mundane result of natural selection. Ruse explained, "Morality, or more particularly the moral sense, comes about because the

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[585] Ruse, *Taking Darwin Seriously,* 207.

[586] Ibid.

[587] Ruse, *Darwinism and its Discontents*, 239.

[588] Ruse, *Sense or Nonsense?,* 196.

[589] Ruse, *Philosophy After Darwin*, 496.

moral human has more chance of surviving and reproducing than the immoral person."[590] Nothing more, nothing less.

To illustrate this concept, Ruse asked the reader to imagine living near a river or ocean where everyone is at risk of drowning. If the reader were to fall in the water, Ruse would "help you from drowning because of my biological urges to do so. Although this puts me at a one in twenty risk of drowning myself, I in turn avoid the one in two risk of drowning were you never to respond to my cry for help."[591] In this scenario it is easy to see how moral sentiments could evolve because, due to the law of averages, the biological "gamble" to develop moral intuition will pay off over time.[592] Thus, morality, Ruse claims, is just another adaption, making them "part of our genetic heritage as much as our physical features and our sexual desires."[593]

"But, wait!," some may protest. How can evolution explain human beings' incredible ethical diversity? Surely the very existence of "honor killings" demonstrates conclusively that ethics are cultural constructs, as an individual's views on the subject are largely determined by her upbringing. To this reasonable critique, Ruse defers to Noam Chomsky's groundbreaking linguistic research. For generations, the rich diversity and mutual incomprehensibility of the world's languages resulted in an almost unquestioned assumption that each language was a unique cultural expression. In the 1970s, however,

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[590] Ruse, *Sense or Nonsense?,* 197.

[591] Ruse, *Taking Darwin Seriously*, 219.

[592] Of course, one's genes do not consciously "gamble." I use this verb as shorthand for the natural selection of advantageous genetic mutations.

[593] Ruse, *Darwinism and its Discontents*, 242.

Chomsky had argued persuasively that, despite the superficial differences, each language shared a fundamental "deep grammar."[594] Ruse, following Chomsky's lead, argued "that the same may be true of morality."[595]

Human beings share the same fundamental ethical "grammar" because the vast majority of human evolution occurred on the African plains, long before different groups of people migrated to the continents. Ruse is adamant, however, that the universality of our ethical grammar does not make it objective. This is a tricky concept, especially considering the pains Ruse took to undermine claims of ethical subjectivity. Reality, however, is not binary, which allows Ruse to advocate a third perspective: that "morality is a collective illusion foisted upon us by our genes."[596] If ethics were truly objective, he argues, they would exist independently of humans, and this is not the case. To the contrary, our shared moral predisposition only exists due to the particular historical contingencies of human evolution. "This is not to deny," he elaborates, "that we humans think it has a justification—that we think it objective—but this is part of its adaptive nature. If we thought ethics were simply emotion, it would break down as people realized that it was not binding and started to cheat. So natural selection leads us to think that we

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[594] Dostoevsky's *Crime and Punishment* is a beautiful demonstration that ethics are not subjective. The protagonist in the Russian existential classic, Raskolnikov, murders a woman who is a detriment to the community; everybody would be better off with her dead. Yet, despite, the logical justification of the murder, Raskolnikov is unable to assuage his guilt and he ultimately confesses. The author's intent is to prove the unassailable truth of Christianity, yet Ruse argues that Raskolnikov's inability to live with the murder is due to humans' innate biological repulsion for murder. On a personal note, it was this very tension between existentialism and Darwinism that first started me down the path of studying the cultural history of evolutionary thought.

[595] Ruse, *Philosophy After Darwin*, 507.

[596] Ruse, *Taking Darwin Seriously*, 253.

ought to do things, not just from emotion or desire, but because they are 'really and truly right.'"[597]

Ruse had thrown down the gauntlet in philosophy. Not only had he claimed to know the origin of morality (as a by-product of evolution), he had also stripped ethics of the objectivity many philosophers believed was necessary for it to be credible. Having seen the response to pioneering sociobiologists in other fields, Ruse knew what to expect from his colleagues, so he expected that "the bile will be surging up the throats of most of my fellow philosophers" after reading his controversial claims.[598] He was "very much aware" that he was swimming in dangerous academic water, but it "never really bothered me—I was a full prof with tenure at an undistinguished university in Canada – so I felt quite safe—I did think that biology was part of understanding humankind and so simply said so."[599] Yes, there were those who remained "very hostile" to his arguments, but change always encounters resistance.[600]

When asked if he encountered any professional challenges due to his intellectual positions, Ruse recalled, "very much so, especially getting grants."[601] What bothered him the most, though, were what he saw as the misplaced critiques from those who considered his Darwinian ethics to be tools of oppression. According to him, he "had great resistance from Marxists and feminists because I endorsed human sociobiology" despite the fact

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[597] Ruse, *Darwin and its Discontents*, 255.

[598] Ruse, *Taking Darwin Seriously,* 223.

[599] Ruse, personal correspondence.

[600] Ruse, personal correspondence.

[601] Ruse, personal correspondence.

that he was a deeply committed to progressive values.[602] Forty years later, he still has a hard time concealing his disdain for these critics: "A "Marxist prof at Harvard is a hypocrite in my book—go and teach in the inner city of NYC or Chicago."[603]

The critics of sociobiology have been a consistent theme in the story of evolutionary thinking's return to the social sciences. But who are these men and women, exactly? The vanguard of sociobiologists in anthropology, sociology, psychology, political science, and philosophy have been given ample attention. I fear, however, that the relative lack of space devoted to the critics might have led the reader to view them as simply antiscience activists motivated by political rather than intellectual positions. The leadership of the opposition to sociobiology were highly respected academics who believed that applying evolutionary thinking to human behavior suffered from both moral and intellectual flaws. What is unknown at this point is how successful they were in convincing others that evolutionary thinking is dangerous. The next chapter introduces the critics who have thus far remained in the shadows and examines the aftermath of their efforts.

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[602] Ruse, personal correspondence.

[603] Ruse, personal correspondence.

THE CRITICAL RESPONSE

"Critics" are not protagonists. At a safe distance from the heat of the action, they appraise the performance of others who brave the spotlight.[604] The label "critic," therefore, is not neutral, as it relegates people to peripheral—and typically negative—roles. Sophisticated readers, however, recognize that reality is not so black-and-white, that every person is the star of his own show, and that an author's decision to label certain people "critics" is subjective. In the context of the current historical narrative, the focus has been on the return of evolutionary thinking to the social sciences. I have attempted to explain what caused this important intellectual shift to occur when it did; thus, the men and women who were responsible for this development took center stage and those who opposed them were…well, critics. Yet, this label is not entirely fair or accurate, for the critics, in addition to being protagonists in their own narrative of heroic defense against biological determinism, also played a vital role in the successful return of evolutionary

[604] Theodore Roosevelt's speech "Man in the Arena" articulates the cultural value awarded the protagonist: "It is not the critic who counts; not the man who points out how the strong man stumbles, or where the doer of deeds could have done them better. The credit belongs to the man who is actually in the arena, whose face is marred by dust and sweat and blood; who strives valiantly; who errs, who comes short again and again, because there is no effort without error and shortcoming; but who does actually strive to do the deeds; who knows great enthusiasms, the great devotions; who spends himself in a worthy cause; who at the best knows in the end the triumph of high achievement, and who at the worst, if he fails, at least fails while daring greatly, so that his place shall never be with those cold and timid souls who neither know victory nor defeat. Teddy Roosevelt, "Citizenship in a Republic," (speech, Paris, France, April 23, 1910).

thinking by compelling sociobiologists to shift their focus from behavior to psychology.

Much of the early sociobiology, despite the authors' protests to the contrary, was riddled with offensive language towards women and people of color. Flush with excitement over sociobiology's potential, sociobiologists often reached too far and made claims about direct genetic influence on human behavior that could not be supported by scientific evidence. The critics of sociobiology, who had "their antennae up" for regressive science due to Arthur Jensen's recent controversial research on race and intelligence, immediately attacked some of the more speculative assertions.[605] As a result of these attacks, sociobiologists (as a whole) seriously reevaluated their positions and made the necessary adjustments. In time, those who wished to continue the return of evolutionary thinking to the social sciences adopted a new moniker for their efforts, evolutionary psychology, which emphasizes the evolution of mindsets rather than specific behaviors. This new approach serves as the foundation for the current widespread adoption of evolutionary thinking across disciplines and should be seen as the synthesis of sociobiology and the critical response to it, not as the triumph of sociobiology under a different name.

The impetus to transform sociobiology into evolutionary psychology came from the offensive and incorrect statements made by sociobiologists themselves. Perhaps this was inevitable. Perhaps those who disregard academic taboos are also those who disregard social conventions; their academic iconoclasm and social impropriety are, so to

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[605] Jon Beckwith, *Making Genes, Making Waves: A Social Activist in Science* (Cambridge: Harvard University Press, 2002), 136.

speak, two sides of a coin and you cannot have one without the other.[606] Though plausible, I do not think this is the case when it comes to sociobiology. Instead, I think sociobiologists were orthodox liberal men whose genteel paternalism simply stopped holding moral authority with a generation radicalized by Vietnam and the civil rights movement. In the new moral climate, the opinions of "responsible patriarchs" came to be seen as condescending assertions of white male authority.

To the modern eye, many of the leading sociobiologists were hopelessly sexist. Here is Michael Ruse, writing in 1979*:* "It is certainly implied by today's sociobiology that because of their biology men will tend to be more dominant, more polygamous, and if any avoidance of child-rearing occurs it will be by them."[607] A male, he explains, just "wants to fertilize and get away and go on to the next; the female wants to be fertilized, but she wants to hang on to the male for help."[608] Not very nuanced thinking from a professor of philosophy. Richard Alexander believed that monogamy was the result of "pressure exerted by females to monopolize a male's parental behavior" and that women were among the "resources" for which men competed.[609] Even in their dealings with respected female colleagues, sexism reared its ugly head. When asked about Sarah

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[606] There is some evidence for this perspective. Pierre van den Berghe clearly held irreverent views on a number of subjects and he was not reticent to speak his mind about any of them. Here is his opinion on higher education in the United States: "The American University is subservient to capitalist donors, football-crazed alumni, backwoods state legislators, Bible-brandishing synods, and missile-wielding warlords and run by supine, opportunistic administrators."

[607] Ruse, *Sociobiology*, 99.

[608] Ibid., 93.

[609] Alexander, "Search for a General Theory," 95.

Hrdy's remarkable research in the Indian jungles, Robert Trivers admitted, "My own view is that Sarah ought to devote more study and thought to raising a healthy daughter."[610]

A major problem with sexism in sociobiology was that it lent credibility to the notion that gender inequality is natural and thus inevitable. E.O. Wilson, for example, started with the claim that "in hunter-gatherer societies, men hunt and women stay at home. This strong bias persists in most agricultural and industrial societies and, on that basis alone, appears to have a genetic origin."[611] He then concluded, "the genetic bias is intense enough to cause a substantial division of labor even in the most free and most egalitarian of future societies."[612] Wow. In these short sentences he dismissed the hopes of generations of feminists. Could education not remove the glass ceiling preventing women's professional success? Not according to Wilson, who argued, "even with identical education…men are likely to continue to play a disproportionate role in political life, business and science."[613]

Women were not the only ones with reason to fear a sociobiological future. Immigrants and people of color would also struggle to find their place, as many prominent sociobiologists believed racism and xenophobia to be genetic adaptations alongside patriarchy. Van den Berghe, for example, claimed that "any quality rooted in biology will be with us for the foreseeable future"; and while this might seem innocuous

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[610] Quoted in Hrdy, *Mother Nature,* 490.

[611] Wilson, *In Search of Nature,* 92.

[612] Ibid.

[613] Ibid.

at first glance, van den Berghe's previous statement that "ethnocentrism and racism are deeply rooted in our biology" illuminate the deeply regressive social implications of the claim.[614] To progressives, America's potential greatness depended on overcoming a long history of racial strife to create a colorblind democracy but Hamilton appeared to aim in the opposite direction. In the short article "Innate Social Aptitudes of Man," he professed his "hope to produce evidence that some things which are often treated as purely cultural in humans—say racial discrimination—have deep roots in our animal past and thus are quite likely to rest on direct genetic foundations."[615] Likewise, Barash turned a popular bumper sticker slogan upside down when he argued, "it is not true that nobody is born a bigot."[616]

According to sociobiologists, the evolution of xenophobia and racism were not unfortunate aberrations but necessary corollaries to morality. Seemingly paradoxical, the intimate relationship between good and evil is entirely logical from a sociobiological point of view. Altruism exists in the context of kin selection and reciprocal altruism because it is adaptive—an individual's genetic reproduction increases when they behave altruistically towards their relatives and friends. Over time, trust builds in the community and they all benefit from their collective sacrifice for the common good. There is a threat to their prosperity, however, and that is the introduction of an individual or group who do not share the same genes and who will not reciprocate the goodwill shown them. These

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[614] Van den Berghe, *Man in Society*, 124. Van den Berghe, *The Ethnic Phenomenon*, xi.

[615] Hamilton, *The Narrow Roads of Gene Land,* Vol. 1, 330.

[616] Barash, *The Whisperings Within*, 154.

"outsiders" can exploit the host group's kindness and give nothing in return. As Hamilton explained, "For collective sacrifice to work members (of the community) need and are expected to evolve a degree of xenophobia."[617] Or, as Barash put the matter, "prejudice and racism might have roots in the biological tendency to distinguish between in-group and out-group."[618]

Critics of sociobiology rightfully feared that the new discipline naturalized sexism, racism, and xenophobia. Anticipating this response, the sociobiologists went out of their way to assure people that you cannot derive a cultural "ought" from a biological "is." In *Darwinism and Human Affairs*, Richard Alexander emphasized, "Evolutionary analysis…has essentially nothing to say about what goals are desirable" and "nothing whatsoever" to do with ethics.[619] It is like our predilection for sweet food. Craving sugar, which is a biological adaptation, does not mean we should abandon efforts to eat healthy. Still, with a little digging, it was possible to find evidence that at least some sociobiologists believe that a greater understanding of the genetic causes of behavior *should* lead to some acceptance of biological limitations. "Judge me a moral monster if you will," Ruse admits, but consider the example of "a woman with an IQ of 71—just about the level that even today's Supreme Court thinks makes a person incompetent—who had eight children out of wedlock. Is it absolutely wrong if the state says, 'Get sterilized or we will keep you out of society until you are past reproductive age?' I keep thinking of all of those kids. Even if they are not genetically inferior, I doubt very much

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[617] Hamilton, *The Narrow Roads of Gene Land,* Vol. 1, 188.

[618] Barash, *The Hare and the Tortoise*, 310.

[619] Alexander, *Darwinism and Human Affairs*, 220 and 276.

that they are going to have the warm, nurturing upbringing I have tried to give my children."[620]

Hamilton, who established the scientific foundation for sociobiology, supported eugenics although "the thoughts were painful."[621] In one of his darker moods, he lamented, "The only sure recipe for improving society is eugenics. Either it is that or else, not many generations hence, tranquilizers and other mood drugs and unlimited medical patches for every one of us all of the time."[622] In 1969, while at the "Man and Beast: Comparative Social Behavior" conference held in Washington, D.C., a senator's wife asked Hamilton how his research could reduce violence and crime in America. Hamilton demurred from the difficult question but he wanted to say "she should make sure the laws (her husband) helps to enact are always such as to encourage not merely the direct influence but also the breeding of citizens democratically considered above average in ability, kindliness, and health, while discouraging influence and breeding from opposites."[623] Hamilton did acknowledge, "it is hard, perhaps impossible, to define what is best."[624] But he also believed that it was "not so hard to say what is simply moderately good and that is all we need; on the other side it is less difficult than most seem to think

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[620] Michael Ruse, "Review of Better for all the World: The Secret History of Forced Sterilization and America's Quest for Racial Purity," *Washington Post*, April 27, 2006.

[621] Hamilton, *The Narrow Roads of Gene Land,* Vol. 1*,* 189.

[622] Ibid., 193.

[623] Ibid., 194.

[624] Ibid.

to define what are bad and worst."[625]

Radical scholars had heard enough. Sociobiologists' descriptions of sexism, racism, and xenophobia as "natural" convinced them that they were dealing with another iteration of biological determinism, not a revolutionary insight into human behavior. The introduction of population genetics and kin selection might be new, but in the end "there was really nothing that separated the program or specific claims of the social Darwinism of the 1870s from the Darwinian sociobiology of the 1970s."[626] According to the radicals, "The reason for the survival of these recurrent determinist theories is that they consistently provide a genetic justification of the status quo and of privileges for certain groups according to race, class, or sex."[627] In the context of increasing public demands for racial and gender equality, therefore, sociobiology could be seen as "an attempt to deflect the force of (the protests) by denying their legitimacy."[628] For the critics of sociobiology, many of whom were political activists themselves, it was imperative to discredit Wilson and his ideological brethren as soon as possible because "the theories put forth by the sociobiologists…. convince people that revolutionary changes in social relationships (e.g. class structure and sex roles) are impossible."[629]

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[625] Ibid.

[626] Richard Lewontin, Steven Rose, and Leon Kamin, *Not in Our Genes: Biology, Ideology, and Human Nature* (New York: Pantheon, 1985), 243.

[627] Elizabeth Allen, Barbara Beckwith, Jon Beckwith, Steven Chorover, and David Culver, et al., "Against Sociobiology," *The New York Review of Books,* November 13, 1975, accessed November 1, 2016, http://www.nybooks.com/articles/1975/11/13/against-sociobiology/

[628] Lewontin et al., *Not in Our Genes*, 22.

[629] David Chidakel, "Sociobiology: The Skewed Synthesis," *Science for the*

Dr. John Beckwith was among the first to take on the challenge. Skinny, bespectacled, with a goatee and dressed "hip" (for an interview with *BioEssays* in 2007 he wore a leather vest), Beckwith embodied the intellectual and cultural background of many of the critics. For the most part, they came from bigger cities and went to better schools, with Beckwith himself attending Harvard after growing up in New York. Further, they embraced their identity as radical intellectuals who rejected "square" American values and institutions. Beckwith had become a "Francophile" after spending "the summer of 1957 bicycling through Europe, much of it in France," and he credits "the books I began to read during (his) college years," particularly the works of Camus and Sartre, with heavily influencing his political views.[630] In short, Beckwith and his colleagues considered themselves to be more sophisticated thinkers—and people—than the sociobiologists. To some extent, the critics' arrogance (Gould admitted that he was "not a modest person") had merit, as they were by all measures inordinately successful professors.[631] For example, by 1969 Beckwith had become a rising star in microbiology and genetics at Harvard for being "the first to totally separate a gene from all the other genes that normally surrounded it in the organism's chromosomes."[632] To honor this

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People Magazine VII, no. 6 (November, 1975): 28.

[630] "Interview with Dr. Beckwith," *BioEssays: Ideas that Push Boundaries* 29, no. 12 (2007): 1258.

[631] Stephen Jay Gould, *The Mismeasure of Man* (New York: W.W. Norton & Company, Inc., 1981), 32.

[632] Beckwith, *Making Genes, Making Waves,* 5.

groundbreaking work he received the prestigious Eli Lily award. At the ceremony, however, Dr. Beckwith chose not to bask in the adulation. Instead, he "condemned the practices of the drug industry, of which the Eli Lilly company was a representative…(and) then announced that I was donating the award money to a Black Panther free health clinic."[633] Clearly this was a man who would not shrink from his convictions. And, on May 28, 1975, when E.O. Wilson's *Sociobiology* appeared on the front page of the *New York Times*, he rose for another fight.

Although he admittedly felt an initial "Bill Murray-like puzzlement" over the praise given Wilson's book, Beckwith soon grew serious—and very concerned.[634] "Overall," he recalls, "the media gave the impression that there had been major new scientific insights into the genetic influences on human behavior," but "given the impact of past theories of this sort, it seemed to me that those of us who were alert to this history should take a close look at the scientific basis of sociobiology."[635] To this end, he contacted Richard Lewontin, a friend and colleague at Harvard who also held deep political convictions. Born in 1929 in New York, Lewontin looked like your typical professor; he wore glasses and worn-out sweaters, and had an infectious smile when among friends. Lewontin had always been drawn toward social activism. As he recalls, while in high school he and the young woman who would become his wife "were part of a political group that the students organized called "The World we Want."[636] Later,

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[633] Ibid., 6.

[634] Ibid., 135.

[635] Ibid., 138.

[636] Harry Kreisler, "Conversations with History," *Institute of International*

during his stint teaching in Rochester, the two of them, along with like-minded friends, "sat in a police station because of the first incidents of police brutality against black people. That was just they way our lives went."[637] To Lewontin, professors "make a claim on the public purse," and simply satisfying one's intellectual curiosity was just "mental masturbation."[638] He had to do more.

Together, Beckwith and Lewontin "agreed to call together a few people who might share our concerns. We would meet to consider whether and how to respond to this public surfacing of sociobiology. Toward the end of July a small group of us gathered at my house in Cambridge. We sat out on the breezy front porch, escaping the heat of a hot summer night. By this time, our own heat had mounted a sociobiology garnered increasing publicity for its claimed social applications. We decided to read Wilson's book and evaluate scientific basis of its arguments."[639] The small cadre of academics "took on the name "The Sociobiology Study Group" and "over the next few months we met regularly every two weeks, continuing to read and discuss chapters of the book."[640] Within a few months the group decided "to publish a critique of sociobiology in a journal

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Studies, UC Berkeley, http://globetrotter.berkeley.edu/people3/Lewontin/lewontin-con0.html, accessed May 10, 2016.

[637] Ibid.

[638] Ibid.

[639] Beckwith, *Making Genes, Making Waves*, 139.

[640] Ibid., 140.

that would reach a wide audience."[641] The resulting letter to the *New York Review of Books*, titled simply "Against Sociobiology," became the opening salvo in the attack against sociobiology.[642]

The letter to the *New York Review of Books* did not pull any punches. In it, the Sociobiology Study Group likened sociobiology to the biological determinism that had "provided an important basis for the enactment of sterilization laws and restrictive immigration laws by the United States between 1910 and 1930 and also for the eugenics policies which led to the establishment of gas chambers in Nazi Germany."[643] Members of the group were willing to make such a damning comparison because they sincerely worried that "the explanations which Wilson's *Sociobiology* provides for racism, fascism, and war are unscientific…and dangerous."[644] As academics, they valued the free exchange of ideas, but sociobiology was not idle chatter in a lecture hall; it had the potential to cause great harm to society-at-large and needed to be repudiated. Beckwith explained, "If such statements were limited to academic journals and academic discussions, they would not be of much concern to us."[645] Sociobiology, however, was on

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[641] Ibid., 140.

[642] Elizabeth Allen, Barbara Beckwith, John Beckwith, Steven Chorover, David Culver, et al., "Against Sociobiology," *New York Review of Books*, November 13, 1974.

[643] Elizabeth Allen, Barbara Beckwith, Jon Beckwith, Steven Chorover, and David Culver, et al., "Against Sociobiology," *The New York Review of Books,* November 13, 1975, accessed November 1, 2016, http://www.nybooks.com/articles/1975/11/13/against-sociobiology/

[644] Miriam Rosenthal, "Sociobiology: Laying the Foundation for a Racist Synthesis," *The Harvard Crimson*, February 8, 1977, accessed October 12, 2016, https://www.thecrimson.com/article/1977/2/8/sociobiology-laying-the-foundation-for-a/

[645] Joseph Alper, Jon Beckwith, and Lawrence G. Miller, "Sociobiology is a

the front page of newspapers across the country, and the critics saw this publicity as a "politically motivated" campaign to defend "existing social arrangements as part of our biology."[646]

The Sociobiology Study Group comprised intellectuals from various disciplines with shared political values. In their words, we "share a commitment to the prospect of the creation of a more socially just – a socialist – society."[647] Contrary to biological determinists, they "believe that it is possible to create a better society than the one we live in at present; that inequalities of wealth, power, and status are not 'natural' but socially imposed obstructions to the building of a society in which the creative potential of all its citizens is employed for the benefit of all."[648] The most prominent member of the group was Stephen Jay Gould, a paleontologist at Harvard who had gained fame as a popular science writer. Like Beckwith and Lewontin, Gould was born in New York. As a young boy his court reporter father took him to the American Museum of Natural History, where he encountered his first dinosaur. "I had no idea there were such things—I was awestruck," he recalls.[649] From that point forward there was no doubt he would study the

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Political Issue," in *The Sociobiology Debate: Readings on the Ethical and Scientific Issues Concerning Sociobiology* (New York: Harper & Row Publishing, 1978), 478.

[646] Stephen Jay Gould, "Sociobiology and the Theory of Natural Selection," in *Sociobiology: Beyond Nature/Nature?* (Boulder: Westview Press, Inc., 1978), 262.

[647] Lewontin, *Not in Our Genes*, ix.

[648] Ibid., 9.

[649] Michelle Green, "Stephen Jay Gould: Driven by a Hunger to Learn and to Write," *People* 25 (June, 1986): 109.

fossils of these amazing creatures. There was also no doubt to those that knew him that Gould would be at the forefront of any battle concerning scientific justification of inequality. Throughout his life Gould had embraced the activism of the 60s, participating in lunch counter sit-ins and boycotts as a member of the Student Non-Violent Coordinating Committee.[650] In *The Mismeasure of Man*, which he wrote to combat biological determinism, Gould explains the intimate connection between his politics and his scientific criticism. "My father," he writes, "became a leftist, along with so many other idealists, during upheavals of the depression, the Spanish Civil War, and the growth of Nazism and fascism….(and) I shall always be gratified to the point of tears that, although he never saw *The Mismeasure of Man* in final form, he lived just long enough to read the galley proofs and know that his scholar son had not forgotten his roots."[651]

Feminists played a large role in The Sociobiology Study Group. Throughout history women's biology had been used to rationalize their oppression, and now, in the context of the social activism of the 1970s, those who were committed to gender equality believed it was imperative to discredit the return of scientific narratives that perpetuated the notion of women's "natural" inferiority. In one sense, the feminists' criticism of sociobiology's biological determinism simply echoed the broad ideological position taken by all of the critics; however, there were subtle differences due to women's particular historical experiences of injustice that made their criticisms unique. For example, when Enlightenment scientists sought proof of natural inequalities between the

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[650] According to Gould, he "felt crushed when, in a wave of understandable though lamentable narrowness, the black leaders of the Student Non-Violent Coordinating Committee decided to remove whites from the organization."

[651] Stephen Jay Gould, *The Mismeasure of Man,* 39.

races and sexes (an endeavor motivated, perhaps, by a need to justify white men's monopoly of power in an era of universal "natural rights"), there were "glaring asymmetries in studies of race and sex in this period."[652] As the historian of science Linda Schiebinger cleverly points out, "it was fraternitè, not humanitè, that was celebrated alongside egalitè and libertè in the great bourgeois revolution" of the time, which made black men's place in the republic problematic, but not necessarily women's.[653] Power belonged exclusively to men, the revolution did not change that—and, in fact, the women who "forgot the virtues of (their) sex" and assumed too much public authority often found themselves on the wrong end of a guillotine blade.[654]

More recently, and of more importance to the feminist critics of sociobiology, women had experienced the taboo against biological thinking in the social sciences differently. That is to say, they hadn't really experienced it all. While UNESCO and various academic organizations were loudly and proudly proclaiming the invalidity of biological analyses of human beings with regard to race, there was nary an official word about the prevailing, and quite damaging, biological narratives of women's "natural" domesticity. Therefore, feminists, while allied with their fellow critics who emphasized race or class, did in fact have their own agenda.[655] They were on the front lines to get

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[652] Londa Schiebinger, *Nature's Body: Gender in the Making of Modern Science* (Boston: Beacon Press, 1993), 146.

[653] Schiebinger, *Nature's Body,* 175.

[654] Ibid., 179.

[655] Of course, not all feminists agreed on the best course of action. In fact, when Patricia Adair Gowaty hosted a symposium on evolutionary biology and feminism almost twenty years after the publication of E.O. Wilson's *Sociobiology*, the "in-the-hall discussions were (still) some of the most animated I have seen anywhere."

biology *finally* off their backs, not trying to prevent its return.

As part of their sustained struggle against biological determinism (sociobiology was seen as only the latest iteration) feminists set out to challenge the objectivity, and thus authority, of science as currently practiced. Ruth Bleier led the charge, revealing androcentric, if not sexist, epistemological motivations throughout evolutionary theory. Her research inspired Helen Longino, Anne Fausto-Sterling, Evelyn Fox-Keller, Donna Haraway, and other feminist luminaries to explore the "the role that values in general, and gender values in particular, play in the production of scientific or biological knowledge."[656] According to these women, science is subjective. Like everything else we do, science is conducted through the filter of our own perspective, and because scientists in the mid-twentieth-century, who were almost all men, lived in a society that marginalized women, this meant they would almost inevitably conduct hopelessly sexist research. This is not to say that they were bad people. Fausto-Sterling explains that her intention was to simply demonstrate "how ideological constructs become part of science done in good faith by successful, well-meaning scientists."[657]

During the sociobiology controversy feminists highlighted the inherently subjective nature of science because they thought sociobiologists were pushing a political agenda under the cover of false objectivity. In "Sociobiology, Morality, and Feminism,"

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[656] Carla Fehr, "Feminist Philosophy of Biology," *The Stanford Encyclopedia of Philosophy,* https://plato.stanford.edu/entries/feminist-philosophy-biology/. Accessed May 15, 2017.

[657] Anne Fausto-Sterling, "Book Review of *Defenders of the Truth: The Battle for Science in the Sociobiology Debate and Beyond*," by Ullica Segerstrale*, Genome News Network*, http://www.genomenewsnetwork.org/articles/01_01/Defenders_truth.php. Accessed May 15, 2017.

A.T. Nuyen despaired, "Modern anti-feminists fervently believe that they are dealing in truth (and) their main weapon is science."[658] To women who had committed their lives to gender equality, it seemed that sociobiologists were using their authority to sanction patriarchal social norms just as the women's rights movement was beginning to reap the fruits of their labor—and they claimed to be neutral while doing so! Ruth Hubbard, the editor of *Women Looking at Biology Looking at Women,* recognized the popular appeal of apparently objective science, so she made the political implications of sociobiology explicit: "The new science of sociobiology would have us believe that women stay home with the children because their eggs are large (hence metabolically more expensive) than their husband's sperm and that women's "nurturing instinct" has evolved to guard these biological investments."[659] For their part, feminist scientists had embraced what Donna Haraway coined "situated knowledge," or the acknowledgement that one's perspective influences every aspect of research and publication. Clearly frustrated that her political adversaries were not holding themselves to the same standards, Fausto-Sterling proposes the ground rules for the fight ahead in *The Myths of Gender,* "The critics of sociobiology make no bones about their beliefs. It is high time that those who make pronouncements about human sociobiology own up to theirs."[660]

Of course, Wilson and the sociobiologists would argue that they were also

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[658] A.T. Nuyen, "Sociobiology, Morality, and Feminism," *Human Studies* 8, no. 2 (1985), 170.

[659] Ruth Hubbard, ed., *Women Look at Biology Looking at Women: A Collection of Feminist Critiques* (Boston: Schenkman Publishing Co., 1979), xx.

[660] Anne Fausto-Sterling, *Myths of Gender: Biological Theories About Women and Men* (New York: Basic Books, Inc., 1985), 204.

liberals—that they, too, wanted to help build a more just society. Within a short time of *Sociobiology's* publication, however, a discerning reader could find evidence that sociobiological thinking was indeed being used to justify the existing social order. A front-page *New York Times* article written on November 30th, 1977, for example, claimed, "Even some staunch feminists are reluctantly reaching the conclusion that women's aspirations may ultimately be limited by inherent biological differences that will forever leave men the dominant sex."[661] Dr. Judith Bardwick, a psychologist, feminist, and a dean at the University of Michigan, was interviewed for the article. In light of recent scientific discoveries, she found herself "saying things that she herself does not want to believe and that are anathema to the very movement she supports."[662] Specifically, Bardwick admits, "if you define dominance as who occupies formal roles of responsibility, then there is no society where males are not dominant. When something is so universal, the probability is—as reluctant as I am to say it—that there is some quality of the organism that leads to this condition."[663] The founder of the National Organization for Women, Dr. Rossi, also found her commitment to gender equality waning. "It may mean," Rossi lamented, "that there never will be full parity in jobs, that women will always predominate in the caring tasks like teaching and social work and in the life sciences, while men will prevail in those requiring more aggression—business, and politics, for example."[664] The writing was on the wall. If those opposed to sociobiology

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[661] Gould, "Sociobiology and the Theory of Natural Selection," 263.

[662] Ibid.

[663] Ibid.

[664] Ibid.

wanted to prevent the general public from biological determinism, they would have to act quickly and decisively.

In order to more effectively combat what they perceived as sociobiology's threat to gender and racial equality, the Sociobiology Study Group joined forces with another organization of radical intellectuals, Science for the People. The founders of Science for the People had formed in 1969 to "establish a forum where all concerned scientists—and especially students and younger members of the profession—may explore the questions, Why are we scientists? For whose benefit do we work? What is the full measure of our moral and social responsibility?"[665] Its members were concerned that the supposedly objective nature of science had led scientists to unwittingly support unethical programs such as nuclear warfare, and in response they hoped to re-establish scientists as benefactors of the common good.[666] As fellow radicals, Science for the People shared the

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[665] Michel Goldhaber, Martin Perl, Marc Ross, and Charles Schwartz, "Founding Document of Science for the People," accessed Oct 12, 2016, http://science-for-the-people.org/writing-by-sftp/

[666] In a particularly inspiring passage, *Science for the People* declared: "We see our cities falling apart, people thrown out of work, education and other vital social programs being cut back and the danger of war continually increasing. At the same time, people are struggling against these attacks on their standard of living. Workers are fighting back everywhere and there are many rent strikes, teacher strikes, student demonstrations, and other actions. And where is science in all of this?

The health of this country is declining as huge amounts of money are being put into high-level medical technology while day-to-day problems of preventive medicine, diet and exercise are being ignored. Little attention is given to the problems of industrial health and safety as workers are being sped up and companies cut costs, leading to more accidents. Only a small amount of investigation is going into the effects of industrial pollutants even though it has been shown that they may be a major cause of cancer and other diseases. More and more research gets poured into developing new weapons and new methods of warfare, while other research and education in science gets cut back.

Sociobiology Study Group's concern about biological determinism; therefore, starting in 1975, they began publishing a steady stream of articles condemning sociobiology.[667]

The articles on sociobiology in the *Science for the People* magazine focused on the dangerous political implications of biological determinism. Written by professional academics, the tone of these articles was surprisingly conspiratorial: "In periods of social unrest and questioning, there is typically a resurgence of the nature-nurture question. Tremendous publicity is given to supposedly scientific theories that purport to show that poverty, hunger, unemployment, disease are due to our genes and not products of our social institutions."[668] From this perspective, sociobiology is "not science, it is propaganda, touted by the media not for its scientific merits but for its political functions."[669] And who stood to gain from claims of biological determinism? According

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While crime is running rampant because of economic deterioration, scientists are running around "proving" that crime is a genetic problem (XYY "research") and figuring out ways to "treat" it with drugs, behavior modification, and special screening to "weed out the bad kids." Meanwhile technology is being developed to aid police forces and government agencies in social control, e.g. new computerized information and communication systems - technology that can keep down the struggles of people for a better life. The reason for all of this is that the overall thrust of science in this country is not to serve the needs of people but to serve the needs of the ruling class - big businessmen, bankers, ' industrialists and corporate directors who run the economy on the basis of profits." Freda Salzman, "AAAS: Bicentennial and Beyond," *Science for the People Magazine* 8, no. 2 (March, 1976): 21.

[667] The similarity in organizational views was also due to the fact that some people, such as Jon Beckwith, were influential members of both.

[668] Freda Salzman, "Sociobiology: The Controversy Continues," *Science for the People Magazine* 11, no. 2 (March/April 1979): 21.

[669] Barbara Chasin, "Sociobiology: A Sexist Synthesis," *Science for the People Magazine* 9, no. 3 (May/June, 1977): 30.

to the article "Sociobiology: The Controversy Continues," "the group that benefits most from such theories is a small, but powerful, wealthy and privileged class, the corporate elite."[670]

Science for the People desperately fought against what it perceived as sociobiology's counter-revolutionary ideology. In "Sociobiology: A Sexist Synthesis," sociologist Barbara Chasin reassured readers that "the faults in our society, the injustices, the inequalities do not lie in our genes; they are rooted in social institutions, and class structure."[671] Change was indeed possible. "People have challenged," Chasin continued, "with a growing success—sexism, racism, poverty, degradation, and brutality. Cuba, Vietnam, China, Mozambique, Angola are not utopias, but they are supporting a real effort to remove inequality."[672] The respectful reference to nations that had recently become communist demonstrated the extent authors who contributed to Science for the People sincerely believed they were engaged in a proletarian struggle against the establishment. To them, the social activism of the 1960s and 70s was just the start of a major political revolution, one that would face tremendous resistance but was worth fighting for. "Whenever people join together to create a new order," the sociologist Barbara Chasin declared, "those benefitting from the old try to crush the people and their vision. They use weapons to kill, maim and terrorize: and they use theories to demoralize people, to convince them of their essential inferiority, and to reconcile them to the world as it is. But despite the damage that they can cause, despite their capacity to hold back

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[670] Salzman, "Sociobiology: The Controversy Continues," 21.

[671] Chasin, "Sociobiology: A Sexist Synthesis," 31.

[672] Ibid.

genuine progress, neither the bombs, the napalm, the armies, the C.I.A., nor theories of biological determinism can stop the movement to build a new society."[673]

The political pressure greatly affected Wilson, who felt "blindsided by the attack."[674] The soft-spoken professor had "expected some frontal fire from social scientists on primarily evidential grounds" but was not prepared for "a political enfilade from the flank."[675] Twenty years later, he recalled, "In 1975 I was a political naïf: I knew almost nothing about Marxism as either a political belief or a mode of analysis; I had paid little attention to the dynamism of the activist Left, and I had never heard of Science for the People. I was not an intellectual in the European or New York/Cambridge sense."[676] Due to the persistent attacks, which included bullhorns in Harvard Square calling for his dismissal and antisociobiology chants during his lectures, Wilson became known as a reactionary professor, which, in Harvard during the 1970s, was "like (being) an atheist in a Benedictine monastery."[677] As time passed and Wilson saw his personal and professional reputation increasingly sullied, he "received little support from my colleagues on the Harvard faculty. Some friends spoke up in interviews and public radio forums to oppose Science for the People….But mostly what I got was silence."[678] By 1978, Science for the People was celebrating their success with an article called

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[673] Ibid.

[674] E.O. Wilson, *The Naturalist*, 338.

[675] Ibid.

[676] Ibid., 339.

[677] Ibid., 338.

[678] Ibid.

"Sociobiology on the Run."[679]

In February of 1878, the political tension surrounding sociobiology came to a head during a two-day symposium of the American Association for the Advancement of Science in Washington, D.C. It was at this conference, the reader may recall, that activists rushed the stage and poured water over E.O. Wilson, chanting "Racist Wilson, you can't hide, we charge you with genocide."[680] Now that the context for the unusual protest has been more firmly established and Wilson has been properly introduced, I want to take a closer look at that fateful encounter from the perspective of sociobiology's critics, for it is clear that the tenor of the debate changed significantly from that point forward.

A number of people the Sociobiology Study Group and Science for the People attended the infamous conference. In their eyes, "The high drama of the meetings came on Wednesday afternoon, when the center of the controversy, E.O. Wilson, was to speak. The session began with a beautiful critique by Steve Gould, who spent some time demolishing a study by David Barash, an ardent sociobiologist who was the next speaker."[681] It was at this time that Val Dusek, a philosopher and member of Science for the People, "inadvertently opened the door on the stage to a group of demonstrators. They were members of CAR (Committee Against Racism) a radical Maoist group."[682] CAR

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[679] Jon Beckwith and Bob Lange, "Sociobiology on the Run," *Science for the People Magazine* 10, no. 2 (Mar-April, 1978).

[680] Segerstrale, *Defenders of the Truth*, 23.

[681] Beckwith and Lange, "Sociobiology on the Run," 39.

[682] Dusek, personal correspondence.

was not affiliated with any of the other critics of sociobiology—Beckwith referred to them as "a mindless, group of 'storm troopers'"—so no one was prepared for what came next.[683] When the small group of young, African-American activists rushed the stage and doused Wilson, the once staid event disintegrated into "confusion and screaming."[684] In the moment it was unclear what it all meant. Was this the final nail in sociobiology's coffin? Had it become so thoroughly associated with reactionary politics that its practitioners would be denied a seat at the liberal table of academia? Had the taboo against biological analyses of human behavior held?

No one at the conference knew for sure what the reaction to the water incident would be. It was unprecedented, really. Then, after the moderator of the symposium, Alexander Alland, managed to regain control of the event….."a large segment of the audience gave Wilson a standing ovation."[685] The protest had backfired, as members of the audience sympathized with the beleaguered professor. Years later, the sociobiologist Martin Daly acknowledged, "I think the famous water dump actually did some good, in that it made a lot of people feel that they had to stand up for a little civility."[686] Beckwith also recognized the importance of the moment. According to him, when Wilson took the stage "the tide seemed more than ever against him and his followers," but the incident "restored some respect to his position."[687] In order to distance his organization from the

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[683] Beckwith, personal correspondence.

[684] Beckwith and Lange, "Sociobiology on the Run," 39.

[685] Ibid.

[686] Daly, personal correspondence.

[687] Beckwith and Lange, "Sociobiology on the Run," 39.

ugly, failed protest, Beckwith "stood up from the audience after the incident and strongly denounced this action on behalf of Science for the People, making it clear that we opposed such behavior."[688]

The applause for Wilson and subsequent disavowal of the protest did not, of course, signal a sociobiology victory or even an end to the debate, but the sociobiologists had achieved something significant. Their ideas would now be fought on intellectual grounds, not political ones. Before the conference, the critics of sociobiology sought to discredit the discipline as a tool of oppression, but the crass tactics of the Committee Against Racism had upset the sensibilities of everyone present, as no one wanted to see Wilson, a thin, elderly man, treated in such a manner. The members of the Sociobiology Study Group and Science for the People, many of whom identified as Marxists, were not necessarily opposed to utilizing political methods in academic disputes; however, they were "dismayed" by the CAR's protest because they felt that it "made the critics look ridiculous."[689] Afterward, the unusual academic drama received a lot of coverage from the press, most of it portraying the event as a simple narrative of antiscience political activism. If the critics wanted to discredit sociobiology now, they would need to take an intellectual approach, as further political attacks, whether physical or written, could be too easily disregarded for lacking scientific basis.

The taboo, in essence, had been broken, not in the sense that sociobiological theories had "won," but they now had to be included in the dialogue and challenged on intellectual grounds rather than scornfully cast aside. Previously, critics of sociobiology

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[688] Ibid.

[689] Beckwith, *Making Genes, Making Waves*, 147.

saw the new discipline as a simple extension of harmful early twentieth-century biological determinism such as Social Darwinism and eugenics, and subsequently their criticism focused on potential political abuses. After the 1978 AAAS conference, however, neutral observers, who were the very hearts and minds the critics hoped to win, began to see the political attack on sociobiology as a witch-hunt rather than a heroic defense of Western values. To be successful moving forward, the critics would need to firmly establish their critiques on scientific ground.[690] In October of 1978, eight months after the conference, Stephen Jay Gould addressed claims that previous critiques of sociobiology were simply partisan politics: "the foundation of our unhappiness has always been the methodological issue: human sociobiology is unsupported, not merely bedeviled by unfortunate implications. *We may have been more sensitive to the flaws because we disliked the implications, but we didn't make them up* (emphasis added)."[691] Then, not a month later, he reiterated, "I do not act to suppress truth for fear of its political consequences. Truth, as we understand it, must always be our primary criterion."[692]

Due to their transparent communist leanings, the members of Science for the People had the biggest hill to climb when it came to convincing others that their politics were not interfering with their scientific judgment. In March of 1979, one year after the AAAS conference--and their optimistic article, "Sociobiology on the Run"—the

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[690] This is not to say that the critics of sociobiology had previously withheld entirely from scientific criticism. The change is a matter of emphasis.

[691] Stephen Jay Gould, "Sociobiology and Human Nature: A Postpanglossian Vision," *Human Nature* 1, no. 10 (October, 1978): 285.

[692] Gould, "Sociobiology and the Theory of Natural Selection," 262.

magazine took an exhausted, defensive stand in "Sociobiology: The Controversy Continues." Here is the author, the physicist Freda Friedman Salzman: "Critics of sociobiology, with Science for the People usually singled out, are simply dismissed as being Marxists or left-leaning liberals who are letting their politics interfere with hard science—'Burning Darwin to Save Marx,' as the title of a recent article in *Harper's* states. It is claimed that these left-leaning professors, because of their politics, wish to believe that humans are born with a clean slate, and are infinitely malleable. Thus, the argument goes, these politically motivated scientists are trying to discourage studies which would show the genetic basis of human social traits because they are afraid to know the truth. This characterization of our position is a pure fabrication, attributing totally false motives to us."[693] Yes, they were Marxists. The members of Science for the People were not going to hide that fact. But, they believed, *all* scientists had political beliefs of some sort or other. Why should a Marxist scientist be categorically rejected while a liberal or conservative was given the benefit of the doubt? What was important was the science, and the claim of Science for the People was, without question, "that human sociobiology, as presently formulated and promoted, is without any real scientific merit."[694]

In addition to the accusations of political polemicism, critics of sociobiology had to mitigate claims that they were antiscience. Beckwith, for good reason, called these claims "absurd"; many of the men and women involved were, after all, professional

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[693] Salzman, "Sociobiology: The Controversy Continues," 25-26.

[694] Ibid.

scientists and some of them were quite accomplished in their respective fields.[695] Still, in response to the political attacks, sociobiologists had characterized their critics as advocates of strict cultural determinism and the label stuck. To maintain credibility, it would be necessary to articulate the scientific concerns about sociobiology. Stephen Jay Gould, who was the best writer of among them, provided the most eloquent defense of their position: "We who have criticized (sociobiology) have been accused of denying altogether the relevance of biology to human behavior, of reviving an ancient superstition by placing man outside the rest of 'the creation.' Are we pure 'nurturists?' Do we permit a political vision of human perfectibility to blind us to evident constraints imposed by our biological nature? The answer to both is no. The issue is not universal biology vs. human uniqueness, but biological potential vs. biological determinism."[696] While the political implications of sociobiology were indeed terrifying, the Sociobiology Study Group and Science for People now emphasized, the impetus for their outspoken criticism came from their concern over bad science.

Much like their sociobiology rivals, the critics themselves rejected notions of a "blank slate" human nature (to do otherwise, according to Gould, would deny "the fundamental insight my profession.").[697] In Lewontin's treatise against biological determinism, *Not in Our Genes*, he explained how illogical, and ultimately counter-productive, the liberal attachment to cultural determinism was: "The post-1968 New Left in Britain and the United States has shown a tendency to see human nature as almost

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[695] Beckwith, personal correspondence.

[696] Gould, "Biological Potential vs. Biological Determinism," 343.

[697] Gould, *The Mismeasure of Man*, 354.

infinitely plastic, to deny biology and acknowledge only social construction...But this denial of biology is so contrary to actual lived experience that it is has rendered people the more ideologically vulnerable to the 'common sense' appeal of reemerging biological determinism."[698] Of course, the critics agreed, "humans are animals and everything we do lies within our biological potential."[699] But there was a catch. And, Gould stressed, it was the "biggest *but* I can muster—the statement that humans are animals does not imply that our specific patterns of behavior and social arrangements are in any way directly determined by our genes."[700]

The critics of sociobiology had a sophisticated understanding of both genetics and evolution, and they questioned efforts to determine which genes caused which behavioral characteristic: "Why imagine that specific genes for aggression, dominance, or spite have any importance when we know that the brain's enormous flexibility permits us to be aggressive or peaceful, dominant or submissive, spiteful or generous?"[701] Despite the tremendous developments in modern evolutionary theory, they argued, "we can dispense with the direct evidence for a genetic basis of various human social forms in a single word, "none."[702] Earlier in the twentieth-century, geneticists had made major advances deciphering the relationship between genes and phenotype, but those occurred with fruit

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[698] Lewontin et al., *Not in Our Genes*, 10.

[699] Gould, "Biological Potential vs. Biological Determinism," 343.

[700] Ibid.

[701] Ibid., 349.

[702] Richard Lewontin, "Sociobiology: Another Biological Determinism," *International Journal of Health Services* 10, no. 3 (1980): 285.

flies raised in captivity; it would be almost unfathomably more complicated—and unethical—"to perform the kind of breeding experiments, in standardized environments, that would yield the required information" to deduce the genetic influence on human behavior, especially when cultural factors are considered.[703] Because sociobiologists are unable to generate evidence for the role of specific genes on behavior through traditional scientific methods, the critics argued, they resort to speculation. "The method," Lewontin complained, "consists essentially of contemplating the trait and then making an imaginative reconstruction of human history that would have made the trait adaptive, or would have led the possessors of the hypothetical genes for the trait to leave more offspring."[704]

The critics of sociobiology frequently derided sociobiological explanations of behavior as "just-so" stories, an insult referring to Rudyard Kipling's turn-of-the century children's book of the same name that gave humorous explanations for natural phenomena such as the spots on a leopard or a camel's hump.[705] Kipling's stories were obviously of no scientific merit (he originally wrote them to help put his daughter "Effie" to sleep) but sociobiologists, the critics claimed, "also tell just-so stories."[706] Here is a clearly frustrated Lewontin, writing in *Not in Our Genes*, "If one is allowed to invent genes with arbitrarily complicated effects on phenotype and then to invent adaptive

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[703] Gould, "Sociobiology and the Theory of Natural Selection," 262.

[704] Lewontin et al., *Not in Our Genes*, 244.

[705] Rudyard Kipling, *Just So Stories: For Little Children* (Oxford: Oxford University Press, 2009).

[706] Gould, "Sociobiology and the Theory of Natural Selection," 258.

stories about the unrecoverable past of human history, all phenomena, real and imaginary, can be explained."[707] For sociobiology to have any scientific merit it had to be able to be proven wrong, but its practitioners, purportedly, avoided this necessary requirement by settling for mere consistency with natural selection.

Gould critically analyzed two sociobiological explanations of behavior, one human and one animal, to demonstrate that "most work in sociobiology has been done in the mode of adaptive storytelling based upon the optimizing character and pervasive power of natural selection."[708] To prove this point, he provides examples in sociobiology that did just that. The first such example came from a colleague who "insisted that the classic story of Eskimo on ice floes provides adequate proof for the existence of specific altruistic genes maintained by kin selection."[709] According to this colleague, who remained nameless in Gould's critique, "among some Eskimo peoples, social units are arranged as family groups. If food resources dwindle and the family must move to survive, aged grandparents willingly remain behind (to die) rather than endanger the survival of the entire family by slowing an arduous and dangerous migration. Family groups with no altruistic genes have succumbed to natural selection and migrations hindered by the old and sick led to the death of entire families. Grandparents with altruistic genes increase their own fitness by their sacrifice, for they ensure the survival of close relatives sharing their genes."[710] Seemingly pretty standard sociobiology here. And

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[707] Lewontin, *Not in Our Genes*, 261.

[708] Gould, "Sociobiology and the Theory of Natural Selection," 259.

[709] Gould, "Biological Potential vs. Biological Determinism," 347.

[710] Ibid.

Gould acknowledged that "the explanation by my colleague is plausible, to be sure."[711] However, Gould convincingly argued, it was certainly not conclusive because "an eminently simple, nongenetic explanation also exists: there are no altruist genes at all, in fact, no important genetic differences among Eskimo families whatsoever. The sacrifice of grandparents is an adaptive, but non-genetic, cultural trait. Families with no tradition for sacrifice do not survive for many generations. In other families, sacrifice is celebrated in song and story; aged grandparents who stay behind become the greatest heroes of the clan. Children are socialized from their earliest memories to glory and honor such sacrifice."[712] Surely sociobiological science, if it were to remain a science, had to do more than provide one of many competing interpretations.

The next sociobiological explanation in Gould's crosshairs was David Barash's experiment on aggression and cuckoldry among mountain bluebirds. You may remember this experiment. Barash had concluded that male birds were more aggressive before they had fertilized their partner's eggs (and thus secured their reproductive potential) after observing a male bird's decreasing violence in response to a stuffed male decoy placed near his nest. Again, Gould admitted Barash's explanation was "a perfectly plausible story that may be true," but he was concerned that Barash felt no need to do more than establish "consistency with natural selection."[713] "What about the obvious alternative,

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[711] Ibid.

[712] Ibid.

[713] Gould, "Sociobiology and the Theory of Natural Selection," 260. Richard

dismissed without a test," Gould complained, that the "male returns at times two and three, approaches the model a few times, encounters no reaction, mutters to himself the avian equivalent of 'it's that damned stuffed bird again,' and ceases to bother?"[714] Again, it appeared that a sociobiologist had prematurely claimed confirmation of his theory, which gave teeth to the troubling questions that began to circle the discipline. Was sociobiology hot air? Could every explanation of adaptive behavior be countered with a nongenetic alternative? Despite the playful etymology of "just-so" stories, the accusation was clearly no laughing matter.

Lewontin and Stephen Jay Gould, "The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptationist Programme," Proceedings of the Royal Society of London, Biological Sciences 205, no. 1161 (September, 1979): 588.

[714] Gould, "Sociobiology and the Theory of Natural Selection," 261.

A NEW SYNTHESIS

The characterization of sociobiology as a collection of "just-so" stories threatened to discredit, once again, biological analyses of human affairs, as people on both sides of the argument came to see that sociobiologists had mistakenly assumed every behavior was adaptive. An anthropologist who strongly supported the integration of social sciences with biology, Jerome Barkow, admitted, "There is danger in the assumption of adaptive value. Given a good imagination, we can each be experts on evolution, advancing endless naturalistic explanations."[715] The acceptance of sociobiology's failings, however, did not necessarily imply support for a return to strictly cultural perspectives in the social sciences. To Barkow, it was "entirely appropriate to utilize the paradigm of Charles Darwin." The challenge was to do so correctly.[716] Having seen the flaws in sociobiology, Barkow and others, many of whom eventually identified as "evolutionary psychologists" for political and theoretical reasons, began to advocate a humbler, more careful approach that limited claims of adaptation and focused on mindsets rather than behaviors.

Donald Symons, an anthropologist at Santa Clara, shared Barkow's concern that "the Darwinian wagon may be in danger of being hitched to a meteor shower," meaning,

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[715] Jerome Barkow, *Darwin, Sex, and Status: Biological Approaches to Mind and Culture* (Toronto: University of Toronto Press, 1989), 8.

[716] Jerome Barkow, "Darwinian Psychological Anthropology: A Biosocial Approach," *Current Anthropology* 14, no. 4 (October, 1973): 373.

presumably, that sociobiology was bound to crash and they did not want evolutionary analysis as a whole to go down with it.[717] The first thing Symons and Barkow did to preserve the possibility of a future Darwinian social science was acknowledge the limitations of sociobiology. "There are no genes for complex behavior," they claimed, echoing the concerns of Beckwith, Gould, Lewontin, and the other critics.[718] Sociobiologists' previous "attempts to leapfrog the psychological and to apply evolutionary biology directly to human social life have not been successful" because they incorrectly assumed all behavior was adaptive.[719] That assumption was simply wrong. In fact, "there is no justification for assuming that any particular cultural trait is fitness enhancing."[720] Symons chose Sarah Hrdy's argument about female promiscuity to confuse paternity as an example of faulty sociobiology to be avoided. Hrdy, he argued, "believe(d) that her discovery of an adaptive explanation" qualified her research as sound science.[721] It seemed to Symons, however, "that Hrdy had things backwards. Except in parapsychology, an explanation of a phenomenon is not normally considered

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[717] Donald Symons, If We're All Darwinians What's the Fuss About?" in Crawford, Smith & Krebs, *Sociobiology and Psychology* (1992), 135.

[718] Jerome Barkow, *Missing the Revolution: Darwinism for Social Scientists* (Oxford: Oxford University Press, 2005), 4.

[719] Jerome Barkow, Leda Cosmides, and John Tooby*, Adapted Mind: Evolutionary Psychology and the Generation of Culture* (Oxford: Oxford University Press, 1992), 3.

[720] Jerome Barkow, "The Distance Between Genes and Culture," *Journal of Anthropological Research* 40, no. 3 (Autumn, 1984): 386.

[721] Donald Symons, "Another Woman that Never Existed," a review of Hrdy's *The Woman That Never Evolved, The Quarterly Review of Biology* 57, no. 3 (September, 1982): 299.

to be evidence."[722] Clearly, he was willing to throw sociobiologists under the bus if that was what it took to establish the credibility of Darwinian social science. Thirty years later, Symons remains skeptical that sociobiology "delivered much of lasting value."[723]

Despite the occasional academic barb in a journal, the evolutionary psychologists never fully shared the radical activists' contempt for sociobiology, for they viewed the early sociobiologists as important, if misguided, pioneers in the return of a Darwinian social science. Savvy professors who had experienced departmental politics firsthand, the evolutionary psychologists cynically recognized that "the sciences can reasonably be thought of as being organized around systems of scientist's reputations."[724] To make genuine advances it was necessary to move to the periphery of these systems, but "move to the periphery and you take risks."[725] Predictably, the sociobiologists who "violated the taboo against evolutionary thinking found their motives questioned," and this, to Barkow and Symons, was not legitimate intellectual debate but just crude bullying of people who deserved respect.[726] When asked about the "water incident" at the AAAS conference, Symons admitted that he fantasized about "decking the perpetrator."[727]

Part of the reason evolutionary psychologists sympathized with the sociobiologists was that they, too, had been persecuted for their association with

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[722] Ibid., 299.

[723] Symons, personal correspondence.

[724] Barkow, *Darwin, Sex, and Status,* 12.

[725] Ibid., 13.

[726] Ibid., 15.

[727] Symons, personal correspondence.

Hamilton and Trivers.[728] According to Symons, the "scales fell from my eyes" the first time he learned about kin selection, and Barkow believed that "people like Hamilton…and a number of others made genuine mathematical breakthroughs in evolutionary biology that permitted those of us who were already biologically-oriented to sally forth."[729] Because of this intellectual debt, Barkow faced "deep hostility" from the critics of applied biological thinking.[730] For example, a criminologist in his department told him "that what I was doing was just a continuation of phrenology" and "students informed (him) that certain colleagues were warning them not to take his course on human nature."[731]

The professional persecution strengthened both men's resolve to integrate biology with the social sciences. To do so successfully, as we have seen, required acknowledging that sociobiology had reached too far and claimed genetic origins for specific behaviors without conclusive evidence. Barkow humbly admitted these mistakes, but insisted that sociobiology was "not meant as the last word, but the first word."[732] The pioneers in sociobiology knew they were entering unknown territory and none of them were under the illusion they could engage in such a speculative endeavor without error. According to Barkow, "sociobiology was more a paradigm than a simple

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[728] According to Symons, he was denied tenure because of his unseemly affinity for biological explanations of human sexuality. Personal correspondence.

[729] Symons and Barkow, personal correspondence.

[730] Barkow, personal correspondence.

[731] Barkow, personal correspondence.

[732] Barkow, *Adapted Mind*, 4.

theory to be proven," yet the critics wanted to throw it out for its theoretical shortcomings.[733] Instead of such a rash rejection, the appropriate response was to acknowledge that sociobiology should have focused on "the evolution of cultural capacity (rather than) contemporary cultural behavior."[734] Symons concurred. In the provocatively titled, "If We're all Darwinians What's the Fuss About?" he suggested a more "modest role for Darwinism" in the social sciences.[735]

Symons believed the fundamental error of sociobiology was to assume all existing physical and behavioral characteristics were adaptive when, in fact, "adaptation (was) a special and onerous concept that should be used only when it really is necessary."[736] To redress sociobiology's sins, he advocated a "doctrine of parsimony" in the study of adaptation.[737] Applying Occam's razor to evolutionary analyses of human beings, Symons argued, would help evolutionary psychologists avoid the faulty claims of adaptation that had discredited early sociobiology as "just-so stories."

To prove his point, Symons revealed the faulty logic of prevailing sociobiological theories. For example, English evolutionary biologist Richard Dawkins, who considered William Hamilton the "greatest scientist of the twentieth-century" and became famous for popularizing kin selection and reciprocal altruism in *The Selfish Gene,* claimed,

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[733] Barkow, "Culture and Sociobiology," *American Anthropologist* 80, no. 1 (March, 1978): 6.

[734] Ibid., 5.

[735] Symons, "If We're All Darwinians What's the Fuss About?," 133.

[736] Donald Symons, *The Evolution of Human Sexuality* (Oxford: Oxford University Press, 1979), 10.

[737] Ibid., 10.

"genes for becoming reproductively infertile in middle age became more numerous (because) a woman could not invest in her grandchildren if she went on having children of her own."[738] Nonsense! Or at least Symons thought so. Dawkins had disguised a merely plausible adaptive narrative as a conclusion reached through the scientific method. More research would have revealed that few Pleistocene humans lived past the age of forty, so "the number of women who lived long enough for infertility resulting from old age to influence reproductive success must have been negligible."[739] Therefore, "menopause is more parsimoniously interpreted as an artifact than as an adaptation."[740]

Barkow also sought to promote evolutionary analysis by circumscribing the claims of sociobiology. His focus, however, was not on policing overzealous claims of adaptation; it was on toning down Wilson's call to "biologize" the social sciences. Barkow simply wanted to make the social sciences compatible with biology. He called this "vertical integration," and he argued that it was necessary because, "[a] behavioral science concept incompatible with evolutionary biology is just as bizarre as a chemical reaction incompatible with basic physics."[741] A biologist would never propose a theory that violated the law of gravity, so why did some social scientists insist on basing their models on outdated, unscientific archetypes of blank-slate human beings?

Barkow thought the disconnect originated in the disciplines' disparate training: all

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[738] Richard Dawkins, *The Selfish Gene*, 2nd edition (Oxford: Oxford University Press, 1989), 127.

[739] Symons, *The Evolution of Human Sexuality*, 13.

[740] Ibid., 14.

[741] Jerome Barkow, "Broad Training for Social Scientists," *Science* 243, no. 4894 (February 24, 1989): 992.

natural scientists learn the fundamentals of physics, chemistry, and biology, while social scientists study an assortment of "great individualistic, relatively unintegrated thinkers (e.g., Karl Marx, Max Weber, Emile Durkheim, Jürgen Habermas, Michel Foucault, etc.)."[742] Nearly a century had passed since Darwin wrote *On The Origin of Species*, and it was no longer acceptable to consider yourself a scientist, even a "social scientist," if your theories were not compatible with evolution through natural selection. This meant, according to Barkow, "social scientist(s) striving to explain everything in terms of environment and culture must now cope with abundant evidence for very complex, evolved psychology."[743]

Barkow advocated vertical integration and Symons wanted to limit claims of adaptation; what united them was their shared focus on thinking rather than behavior. In personal correspondence, Symons explained, "we called ourselves "evolutionary psychologists (or Darwinian psychologists) because we saw our goal as the study of the evolved machinery of the mind/brain, not really of 'behavior.'"[744] In part, the name change was strategic. "Sociobiology" had become politically and intellectually ignominious by this time, and it would be easier to develop evolutionary analyses of human affairs without that baggage. The shift from sociobiology to evolutionary psychology was not simply subterfuge, however. It held profound implications for future research, as it changed the types of questions researchers would seek to answer. For example, Symons believed that "we will never find that women are innately superior or

[742] Jerome Barkow, *Missing the Revolution*, 31.

[743] Barkow, "Broad Training for Social Scientists," 992.

[744] Symons, personal correspondence.

inferior to men but it may be that they predisposed to like and excel at different tasks. Similarly, racism is not innate, but we may well find it easier to learn to like those who are physically similar to ourselves."[745]

The new research program to understand various aspects of a universal human nature avoided the political resistance to researching gender and race differences as well as the scientific criticism of "just-so" stories, making it a plausible foundation for future research. Of course, not everyone believed evolutionary psychology was categorically different from sociobiology. Richard Lewontin lamented, "'sociobiology' has recently been replaced by the less ideologically tainted 'evolutionary psychology', but *plus ça change, plus c'est la même chose.*"[746] And in a pugnacious exchange of letters with Steven Pinker in the *New York Review of Books*, Stephen Jay Gould called it just another "logically flawed and basically foolish caricature" of Darwinism.[747] Lewontin and Gould, however, were outliers. Other critics less committed to Marxist science grudgingly accepted evolutionary psychology's legitimacy. Beckwith did not approve of "citing theoretical advances in sociobiology in support of their theories," but he allowed that, "the evolutionary psychologists have been more restrained than their 'pop sociobiology' predecessors in offering prescriptive advice to society."[748] Because it

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[745] Barkow, "Culture and Sociobiology," 14.

[746] Richard Lewontin, "Review of The Dark Side of Man: Tracing the Origins of Male Violence," *Nature* 400, no. 6746 (August, 1999): 782. His French quote roughly translates as "The more things change, the more they stay the same."

[747] Stephen Jay Gould, "Darwinian Fundamentalism," *New York Review of Books*, June 12, 1997, http://www.nybooks.com/articles/1997/06/12/darwinian-fundamentalism, accessed December 1st, 2016.

[748] Beckwith, *Making Genes, Making Waves*, 151.

appeared "sort of toned down," (which was precisely what Barkow and Symons intended), he decided to forego criticism and to focus on his own research.[749] Beckwith was not alone. Over time, the critics lost the critical mass necessary to retard further integration of biology with the social sciences, as most intellectuals felt confident that evolutionary psychology successfully resolved the concerns about sociobiology and Social Darwinism. Research into the implications of evolution for human beings continued unabated for the next thirty years, and, as a result, our understanding of economics, anthropology, philosophy, sociology, and political science—of what it means to be human in the modern world—has transformed.

There is overwhelming evidence demonstrating the prevalence of evolutionary thinking in 2016. From academic journals to newspaper articles, literate Americans are inundated with arguments for genetic influence on their bodies, their minds, and the world they live in. Evolution has become "mainstream." Demonstrating that fact with an exhaustive catalog of sources would be tedious to write and boring to read, however, so allow me to instead highlight the influential thinkers who exemplify evolution's current intellectual credibility (for those who remain unconvinced, perhaps because this approach seems too anecdotal, there will be a additional supporting evidence in the footnotes ahead).

Linguistics is the study of language. Before the return of evolutionary thinking in the social sciences, "American linguists regarded the aim of their discipline as being the

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[749] Beckwith, personal correspondence.

classification of the elements of human languages. Linguistics was to be a sort of verbal botany."[750] In practice, this meant a linguist spent most of her time parsing languages into phonemes, morphemes, words, phrases, and sentences.[751] Questions about language's origin had no place in the discipline because everyone assumed, in accordance with the traditional Standard Social Science Model (SSSM), that each language was a unique cultural expression passed down from generation to generation.

Then Noam Chomsky changed everything. According to the philosopher of language, John R. Searle, the revolution took place much as Thomas Kuhn described in *The Structure of Scientific Revolution*: structural linguistics faced "increasing numbers of counterexamples and recalcitrant data which the paradigm could not deal with (and) eventually the counterexamples led Chomsky to break the old model altogether and to create a completely new one."[752] Chomsky argued that all healthy human beings have a Language Acquisition Device (LAD) in their brains that enables them to learn languages intuitively. Language was not an independent cultural construct; it shared a universal "deep grammar" with all languages and children could learn any variation simply through

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[750] John R. Searle, "A Special Supplement: Chomsky's Revolution in Linguistics," *The New York Review of Books,* June 29, 1972, http://www.nybooks.com/articles/1972/06/29/a-special-supplement-chomskys-revolution-in-lingui/, accessed December 10, 2016.

[751] One is immediately struck by the preponderance of jargon in mid-twentieth-century linguistics. For those whose education, thankfully, did not demand familiarity with such absurd terminology, a phoneme is a sound and a morpheme is a unit of a word, so the word "uninteresting" is made up of three phonemes: "un," "interest," and "ing."

[752] John R. Searle, "A Special Supplement: Chomsky's Revolution in Linguistics," *The New York Review of Books*, June 29, 1972, http://www.nybooks.com/articles/1972/06/29/a-special-supplement-chomskys-revolution-in-lingui/, accessed December 10, 2016.

exposure. This explains how "a preschooler's tacit knowledge of grammar is more sophisticated than the thickest style manual or the most state-of-the-art computer language system."[753] Children in the United States, for example, are never formally taught the rules of English. (What percentage of parents or teachers even knows the function of an auxiliary verb?) Instead, they simply "absorb" it by listening to others. Steven Pinker's *Language Instinct*, which was "deeply influenced by Noam Chomsky," declares that "language is the product of a well-engineered biological instinct."[754]

Darwin himself had concluded that "man has an instinctive tendency to speak, as we see in the babble of young children," so the idea did have some scientific precedent, albeit some time removed.[755] However, if indeed language was rooted in the biology of the brain, it remained to be seen where, exactly, these roots were located. Pinker suspected that language originated in the left hemisphere of the brain, for the French physician Paul Broca had previously demonstrated language impairment in two patients who had suffered damage to the eponymously named "Broca's area," which lies above one's left temple. To be sure, Pinker turned to modern technology: "In a new technique called Positron Emission Tomography (PET), a volunteer is injected with mildly radioactive glucose or water, or inhales a radioactive gas, comparable in dosage to a chest X-ray, and puts his head inside a ring of gamma-ray detectors. (Then), computer algorithms can reconstruct which parts of the brain are working harder from the pattern of

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[753] Steven Pinker, *The Language Instinct* (New York: William Morrow and Company, Inc., 1994), 19.

[754] Ibid., 19.

[755] Darwin, *The Descent of Man*, 86.

radiation that emanates from the head."[756] Triumphant, Pinker declared, "The hot spots, as expected, are on the left side."[757]

The "biologization" of the mind has been integral to one of psychology's most influential thinkers, Daniel Kahneman. He has been called "the most distinguished living psychologist in the world" and "certainly the most important psychologist alive today" by his peers.[758] In both 2007 and 2008, a group of powerful men including Elon Musk of Tesla, Jeff Bezos of Amazon, and Larry Page of Google traveled to Napa, California to listen to Kahneman speak. He is a Nobel Prize winner. And his intellectual biography, *Thinking, Fast and Slow*, was a critically acclaimed best-seller. To put it modestly, Kahneman is an important thinker—and his research deals directly with the biology of psychology.

Born in Tel Aviv in 1934, Kahneman earned his doctorate from the University of California, Berkeley before beginning his career at Princeton University. There, he, along with his friend and colleague Amos Tversky, spent decades conducting experiments that demonstrate people are biologically "hardwired" with two distinct systems of thinking, one lightning quick and intuitive but prone to mistakes, and another that takes its time and is indeed logical. At first glance, the first, "fast" system might seem obviously inferior, calling into question why it exists at all, but Kahneman stressed the synergy of our dual systems: "The sophisticated allocation of attention has been honed by a long

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[756] Pinker, *The Language Instinct,* 301.

[757] Ibid.

[758] These comments came from two psychologists at Harvard, Daniel Gilbert and Steven Pinker, respectively.

evolutionary history. Orienting and responding quickly to the gravest threats or most promising opportunities improved the chance of survival."[759] Am I in danger? Is this person friendly or angry? Answers to critical questions such as these often require immediate response, so human beings evolved an ability to go with their "gut," which, although arguably presidential, is clearly not logical.

During his research into "fast" thinking, Kahneman discovered several cognitive biases, which are unconscious errors of reasoning that distort our judgment of the world. For example, he learned that humans have an irrational fear of loss (relative to an equal gain). You can see this at work in commercials that warn the consumer she must "Act Now!" or risk losing out on the opportunity forever. Kahneman called this "loss aversion" and believed that it, too, had a biological explanation: "asymmetry between the power of positive and negative expectations or experiences has an evolutionary history. Organisms that treat threats as more urgent than opportunities have a better chance to survive."[760] In laymen's terms, "if there is a deer in your sights and a lion, you are going to be busy about the lion and not the deer."[761] Our minds are quirky in other ways, too. One would reasonably assume that less pain is preferable to more pain. (As Daffy Duck once said, "I don't like pain, it hurts me.") However, Kahneman found that what matters,

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[759] Daniel Kahneman, *Thinking, Fast and Slow* (New York: Farrar, Straus and Giroux, 2011), 35.

[760] Ibid., 282.

[761] Daniel Kahneman, interviewed on "Daniel Kahneman on Heuristics, Biases and Cognition," *Masters in Business Podcast*, August 9, 2006, https://soundcloud.com/bloombergview/interview-with-daniel-kahneman-masters-in-business-audio.

at least to our remembering selves, is the peak amount of pain, not the total amount.[762] In various experiments using cold water and needles, people overwhelmingly preferred the experience of more total pain when that pain tapered down toward the end, meaning otherwise reasonable people would rather get cut more times if the last few cuts are not as deep. Of course, nobody would come to this conclusion if they thought about it in advance, but that's the point: a lot of the time we are not thinking rationally.

The man who shared the Nobel Prize with Kahneman was Vernon Smith, an economist who also relies heavily on evolutionary thinking. Previously, other economists had integrated evolution into their analyses, but their work suffered from the same simplistic adaptationist thinking as the sociobiologists. Evolutionary psychology facilitated a more sophisticated approach, opening the door for Smith to revolutionize his discipline by effectively killing "Homo Economicus," the rational actor at the heart of classical economics as developed by Adam Smith in the eighteenth-century.

Vernon L. Smith is at heart a laid back, slightly socially awkward guy from Wichita, Kansas.[763] He wears bolo ties and keeps his hair shaggy, if not long. But this unassuming economist set his discipline on fire. When Smith began teaching, he realized that classic economics did not tell the whole story, so he began to reevaluate Adam Smith's arguments. He found that Smith had based his theories on an outdated Cartesian divide between the mind and body, and that this false premise had caused a fissure in the

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[762] Kahneman had an evolutionary explanation for this bias, known as the Peak-End Rule, as well. He believed, "the rules that govern the remembering self of humans have a long evolutionary history" and that "the integral of pain or pleasure over time may be less biologically significant" than the peak experience with regard to survival. Kahneman, *Thinking, Fast and Slow*, 384 and 383.

[763] He diagnosed himself with Asperger's Syndrome in 2005.

foundation of classical economic theory. According to Smith, "Cartesian constructivism applies reason to the design of rules for individual action, to the design of institutions that yield socially optimal outcomes, and constitutes the standard socioeconomic science model. *But most of our operating knowledge, and ability to decide and perform is non-deliberative* (my emphasis)."[764] Humans are not rational. Therefore, attempts to understand the market as a collection of competing self-interests will inevitably be incomplete.

The first step to better understanding economics, Smith believed, was to recognize our evolutionary heritage. In his Nobel Prize acceptance speech he argued, "acknowledging and investigating the workings of unseen processes are essential to the growth of our understanding of social phenomena, and enable us to probe beyond the anthropocentric limitations of constructivism."[765] Economic exchange is not compliance to a set of rules; a group of men did not set out *à la* the French Revolution and draft the working of the economy on a page of paper; instead, the market largely operates by the "traditions that have formed, inscrutably, out of the ancient history of human social interactions."[766] Smith argued that "recent research in evolutionary psychology suggests that humans may be evolutionarily predisposed to engage in social exchange" so it makes no sense to construct economic models based on selfish competition.[767] In fact, "markets

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764 Vernon L. Smith, "Constructivist and Ecological Rationality in Economics," NobelPrize.Org, http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/2002/smith-lecture.html, accessed December 5th, 2016.

765 Ibid.

766 Ibid.

767 Vernon L. Smith, "Behavioral Foundations of Reciprocity: Experimental

in no way need destroy the foundation upon which they probably emerged—social exchange between family, friends and associates"; therefore, "it might be dangerous to inappropriately apply the rules of impersonal market exchange to our cohesive social networks."[768] Thanks to Smith, a new generation of economists are conducting experiments to study alternative market incentives.

Smith's trailblazing work in economics exposed as fraudulent some of Western society's long-standing shibboleths, namely the assumption of rationality and self-interest in market behavior. For some, that is frightening. Others, such as philosopher Daniel Dennett, welcome evolutionary thinking as a necessary "universal acid" capable of exposing flaws in our most cherished beliefs. According to Dennett, the evolutionary perspective "eats through just about every traditional concept, and leaves in its wake a revolutionized world-view, with most of the old landmarks still recognizable, but transformed in fundamental ways."[769]

An elderly, slightly rotund professor at Tufts University, Dennett's long white beard and round glasses give him the appearance of Santa Claus. But this Harvard educated philosopher (he studied under W. V. Quine) is bringing a wrecking ball, not gifts. After learning of evolutionary psychology in the 1980s, Dennett dedicated himself

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Economics and Evolutionary Psychology," *Economic Inquiry* 36, no. 3 (1998): 335.

[768] Vernon L. Smith, "Constructivist and Ecological Rationality in Economics," NobelPrize.Org, http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/2002/smith-lecture.html, accessed December 5th, 2016.

[769] Daniel Dennett, *Darwin's Dangerous Idea: Evolution and the Meanings of Life* (New York: Simon & Schuster, 1995), 63.

to redressing an unforgivable wrong in philosophy: the avoidance of the "single best idea anyone has ever had": evolution.[770] "Today," he complains, "more than a century after Darwin's death, we still have not come to terms with its mind-boggling implications."[771] Philosophers, who, by title, should love to learn, "cannot conceal their discomfort with Darwin's great idea."[772] Their responses range from "nagging skepticism, to outright hostility."[773] Not Dennett.[774] Throughout the corpus of his work, including the best-seller, *Darwin's Dangerous Idea*, Dennett demands that his colleagues address evolution's potential to inform inquiry into some of philosophy's perennial questions such as free will, ethics, and the nature of meaning.

Influenced by W. V. Quine and other "analytic" philosophers whose work dominated the discipline in the mid-twentieth century, many of Dennett's peers looked toward language when contemplating meaning. He argues that this was a mistake. "By concentrating first on linguistic meaning, philosophers have distorted their vision of the minds these words depend on, treating them as somehow *sui generis*, rather than as themselves evolved products of the natural world."[775] In reality, "human beings are products of evolution, and their capacity to speak, and hence mean anything, is due to a

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[770] Ibid., 21.

[771] Ibid., 19.

[772] Ibid., 11.

[773] Ibid., 11.

[774] Dennett does acknowledge that some of the "first stumbling steps into" Darwinian philosophy faltered by claiming more than the evidence could support. Dennett, *Darwin's Dangerous Idea*, 493.

[775] Ibid., 402.

suite of specific adaptations."[776] When one acknowledges our evolutionary heritage, it becomes clear that it is no longer tenable to ignore Darwin in philosophical investigations of any sort. "Any theory of the birth of ethics," for example, "is going to have to integrate culture with biology."[777] This is not something to lament, however, for as much as critics of biological determinism protest to the contrary, "the self-understanding we can gain from science can help us put our moral lives on a new and better foundation, and once we understand what our freedom consists in, we will be much better prepared to protect it against the genuine threats that are so regularly misidentified."[778]

When it comes to morality, there is perhaps no greater academic authority than Peter Singer, whom *The New Yorker* has called the world's "most influential living philosopher," and, like Dennett, evolution informs Singer's analyses.[779] Originally from Australia, Singer now teaches at Princeton University, where he has written prolifically on applied ethics. Most of his colleagues regarded "Wilson's invasion of their territory as too absurd to merit a considered response," and, indeed, Singer acknowledged, "the sociobiological approach to ethics often involves undeniable and crude errors."[780] He remained committed, however, to evolutionary psychology because he was convinced it could help philosophers "gain a better understanding of ethics than has hitherto been

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[776] Ibid., 402.

[777] Ibid., 460.

[778] Daniel Dennett, *Freedom Evolves* (New York: Penguin Books, 2004), 1.

[779] Michael Specter, "The Dangerous Philosopher," *New Yorker*, September 6, 1999, 46.

[780] Peter Singer, Animal Liberation: A New Ethics for Our Treatment of Animals (New York: HarperCollins, 1975), xi.

possible."[781]

By viewing human beings as just another species in the animal kingdom, Singer arrived at some incredibly thought-provoking—and controversial—conclusions. In *Practical Ethics*, for example, he argued that people with severe brain damage or in a coma have less cognitive ability than primates and should not receive public funds. Critics around the world criticized him for his supposed lack of respect for human life (especially in Germany, where the citizenry is quite sensitive to judgments of people's worth), but Singer himself regarded his position as animal advocacy, not the devaluation of people. In fact, Singer went on to lead the modern animal rights movement, eventually convincing millions of people that factory farming and testing on animals was immoral with evolution-inspired arguments: "With the eventual acceptance of Darwin's theory …only those who prefer religious faith to beliefs based on reasoning and evidence can still maintain that the human species is the special darling of the entire universe, or that other animals were created to provide us with food."[782]

Singer's application of evolutionary ethics does not stop with the treatment of animals; he is also interested in politics, for, as a utilitarian, he recognizes politics as the most effective means of improving the largest number of lives. Unapologetically liberal, Singer argues that the Left "is urgently in need of new ideas and new approaches" due to the almost universal failure of communism to improve lives around the world.[783] For

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[781] Ibid.

[782] Peter Singer, *Animal Liberation*, 206-207.

[783] Peter Singer, *A Darwinian Left: Politics, Evolution and Cooperation* (New Haven: Yale University Press, 1999), 6.

most of the twentieth-century, he argues, liberals rejected evolutionary thinking because it seemed to imply biological constraints on human nature and a "belief in the malleability of human nature had been important for the Left because it provided grounds for hoping that a very different kind of human society is possible."[784] Unfortunately, however, "the dream of the perfectibility of humankind turned into the nightmares of Stalinist Russia, China under the Cultural Revolution, and Cambodia under Pol Pot," not a worker's paradise.[785] The time to embrace a Darwinian Left, according to Singer, is now.

In *A Darwinian Left*, Singer suggests "an understanding of human nature in the light of evolutionary theory can help us to identify the means by which we may achieve some of our social and political goals, including various ideas of equality."[786] According to him, the Left has mistakenly accepted the Right's assumptions about evolution, "starting with the idea that the Darwinian struggle for existence corresponds to the vision of nature suggested Tennyson's memorable (and pre-Darwinian) phrase, 'nature red in tooth and claw.'"[787] The reality of evolution, as demonstrated by Hamilton, Trivers, and others, is much more amenable to a Progressive vision of society. Axelrod, for example, has shown the conditions in which cooperation between competing individuals emerges as an evolutionarily stable strategy. Singer believes the left should "learn from Axelrod's work" and "encourage a broader sense of our interests, in which we seek to build on the

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[784] Ibid., 24.

[785] Ibid., 31.

[786] Ibid., 15.

[787] Ibid., 19.

social and cooperative side of our nature, in addition to the individualistic and competitive side."[788]

It might be argued that Singer's positions on evolution and government should be dismissed as amateur speculation (he is, after all, a philosopher and not a political scientist). However, one of the world's foremost political thinkers, Francis Fukuyama, concurs with Singer that the evolution of human beings has profound implications for political science. Fukuyama is a fascinating public intellectual. After studying comparative literature in Paris under the tutelage of Roland Barthes and Jacques Derrida, he became disillusioned with postmodernism and transferred to Harvard, where he earned a PhD in political science in 1979. From there he embarked on a tremendously successful career as both an author and policy analyst. He has consulted the World Bank on state building in developing nations, served as the Deputy Director of Policy Planning in the State Department, become a member of the Rand Corporation, and, most famously, written *The End of History and The Last Man,* which drew international acclaim for his controversial argument that ideological conflict has largely come to an end with the triumph of liberal secularism. In his latest book, *The Origins of Political Order*, Fukuyama again ruffles a few feathers, this time by validating the notion that evolutionary biology "is extremely important as a foundation for any theory of political development, because it provides us with the basic building blocks by which we can understand the evolution of human institutions."[789]

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[788] Ibid., 51, 43.

[789] Francis Fukuyama, *The Origins of Political Order: From Prehuman Times to the French Revolution* (New York: Farrar, Straus, and Giroux, 2011), 28.

According to Fukuyama, political scientists have incorporated beliefs about "the state of nature" into their theories from the very beginning. The reason was simple: in order for a city to be just, Plato and Aristotle argued, it "had to exist in conformity with man's permanent nature." But what, exactly, was that nature? Before the discovery of evolutionary biology, political scientists basically had to guess—and they were often wrong. To Thomas Hobbes, man in his natural state was alone and miserable (his immortal description "nasty, brutish and short" was in fact preceded by "solitary" and "poore" (sp.)). Jean-Jacques Rousseau, on the other hand, romanticized the solitary savage, seeing in him a pure soul uncorrupted by the trappings of civilization. Both Hobbes and Rousseau agreed with John Locke "that human beings are not naturally social, and that society is a kind of artifice that allows people to achieve what they cannot get on their own."[790]

The Enlightenment theorists' depictions of primitive humans might have been heuristic metaphors rather than attempts to accurately depict the ancient past; however, they clearly influenced their respective authors. Fukuyama celebrates that now, thanks to "primatology, population genetics, archaeology, social anthropology, and, of course, the overarching framework of evolutionary biology," we can substitute those metaphors for empirical knowledge.[791] To start, with the benefit of twenty-first-century science it is clear that Hobbes was wrong: human beings are not solitary by nature. In fact, Fukuyama argues, "Everything that modern biology and anthropology tell us about the state of nature suggests the opposite: there was *never* a period in human evolution when human

[790] Ibid., 26.

[791] Ibid., 28.

beings existed as isolated individuals; the primate precursors of the human species had already developed extensive social, and indeed political, skills; and the human brain is hardwired with faculties that facilitate many forms of social cooperation."[792]

The realization that humans are a social species radically transforms the fundamental building blocks of political science. Fukuyama claims that, as members of groups, humans evolved biological predispositions that one must take into account when considering plausible political systems. In his words, "Human beings are not completely free to socially construct their own behavior. They have a shared biological nature…(and) this shared nature does not determine political behavior but it both frames and limits the nature of institutions that are possible."[793] First and foremost among these common traits is a desire to cooperate, which, based on research on chimpanzees and other primates, predates human beings by millions of years and has "two natural sources: kin selection and reciprocal altruism (Author's note: at this point, readers should no longer be surprised at the profound legacy of Hamilton's and Trivers' research)."[794] In addition to cooperation, human beings have evolved "an innate propensity for creating and following norms or rules" and a "desire not just for material resources but also recognition."[795] To Fukuyama, knowing this about ourselves allows him to construct a new, more accurate narrative of political history not based on "great men" or class conflict.

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[792] Ibid., 30.

[793] Ibid. 438.

[794] Ibid., 30.

[795] Ibid., 441.

According to Fukuyama, political history began with the advent of agriculture, as nomadic humans lived in small groups that required minimal organization. Farming brought stable, if not necessarily easy, access to carbohydrates, which resulted in exponential population growth. The increase in numbers meant that a political order was needed. Fukuyama explains, "Depending on climatic conditions, hunter-gatherer societies have a population density from 0.1 to 1 person per square kilometer, while the invention of agriculture permits densities to rise to 40-60 per square kilometer. Human beings were now in contact with one another on a much broader scale, and this required a very different form of social organization."[796] Critical to this transition from hunting and gathering was the development of property rights; however, unlike other political theorists who emphasized private property such as John Locke, Fukuyama argues that "the earliest forms of private property were not held by individuals but by lineages of kin groups."[797] The tribal system functioned well because it relied on the natural bonds between friends and family members.

From this perspective, the "forced collectivization by the Soviet Union and China in the twentieth-century sought to turn back the clock to an imagined past that never existed, in which common property was held by nonkin."[798] In fact, all state-level societies are somewhat artificial and arose, Fukuyama argues, only in areas of great natural resources that faced an outside threat. The great challenge of modern society, then, is to maintain a collective identity when humans are predisposed to relate to each

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[796] Ibid., 55.

[797] Ibid., 66.

[798] Ibid., 65.

other tribally: "once states come into being, kinship becomes an obstacle to political development, since it threatens to return political relationships to the small-scale, personal ties of tribal societies. It is therefore not enough merely to develop a state; the state must avoid retribalization."[799] The solution, predictably, for those familiar with Fukuyama's *End of History*, is democracy. Unique among state organizations, democratic nations benefit from the productivity of large-scale interconnectivity while satiating human being's biological needs. "The rise of modern democracy," Fukuyama concludes, "gives all people the opportunity of ruling themselves, on the basis of the mutual recognition of the dignity and rights of their fellow humans. It thus seeks to restore, in the context of large and complex societies, something of what was lost in the original transition to the state."[800]

At the risk of evidence overload, allow me to introduce one final prominent thinker who also incorporates evolution into his analysis, geographer Jared Diamond. Over the course of his career, Diamond has emerged as one of the world's most influential authors. His book, *Guns, Germs, and Steel*, is a perennial best-seller and won the Pulitzer Prize in 1998. And his overall corpus has earned him the prestigious National Medal of Science, which is bestowed upon those who have made important contributions to science by the president of the United States, as well as membership to the National Academy of Sciences. Diamond joins Fukuyama and the others in this chapter as the leading figures in a new academic establishment that rejects the post-World War II taboo against biological factors in the social sciences, seeking instead to explore what

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[799] Ibid., 81.

[800] Ibid., 445.

implications our shared evolutionary heritage might have for human affairs.

Diamond comes from a family steeped in intellectual and cultural pursuits (his mother and father, both Jewish immigrants from Eastern Europe, were a musician and physician, respectively), so it was expected that he attend prestigious universities, which he did, earning his undergraduate degree from Harvard and his doctorate from Cambridge. For a creative, adventurous young man, however, the typical academic career quickly became stultifying, as he "discovered that scholars are expected to devote their lives to studying and writing about just one tiny slice, occasionally a few tiny slices, of life's broad palette."[801] Fortunately, "in 1985 came a phone call came that changed my life. The director of the Fellows' Program of the MacArthur Foundation phoned to say that I had just been awarded MacArthur Foundation Fellowship for five years, with no strings attached."[802] He immediately set off for Papua New Guinea, which was and remains one of the least explored parts of the world (by nonindigenous people, at least).

Diamond developed close friendships with a number of New Guineans while conducting his academic research and conservation efforts over the years. One of these men, a local headman named Yali, played a critical role in Diamond's intellectual development by posing a simple question the professor could not answer, "Why is it that you white people developed so much cargo and brought it to New Guinea, but we black people had little cargo of our own?"[803] According to Diamond, "the commonest

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[801] "The Third Chimpanzee: The Evolution and Future of the Human Animal," Jared Diamond, accessed January 2, 2016, http://www.jareddiamond.org/Jared_Diamond/The_Third_Chimpanzee.

[802] Ibid.

[803] Jared Diamond, *Guns, Germs, and Steel: The Fates of Human Societies* (New

explanation involves implicitly or explicitly biological differences among peoples;" however, after his extensive experience in developing countries, Diamond had come to fervently believe that there was no inherent intellectual disparity between the races—if anything, he thought that Yali and his countrymen might be smarter because "natural selection promoting genes for intelligence has probably been far more ruthless in New Guinea than in more densely populated, politically complex societies."[804] Determined to discover the true cause of the modern world's hierarchy of technological development and subsequent power he began to examine the past through an evolutionary lens.

As a geographer, Diamond is well aware of the complex differences among faraway cultures. Most of his discipline, in fact, focuses on these differences, with each professor specializing in one group of people and contributing her niche knowledge with others to form a mosaic of geographic understanding. Blessed with a MacArthur Grant, however, Diamond could travel his own path, and he chose to examine the "big picture." His book *Guns, Germs, and Steel* is a global geographic analysis, ultimately concluding that Europeans did, in fact, come to dominate other people due to biological advantages, just not the ones typically claimed by white supremacists. According to Diamond, Europe's military conquests were not facilitated by superior intelligence or strength but just resistance to disease.[805]

York: W.W. Norton & Company, 1999), 14.

[804] Ibid.,18 and 21.

[805] Diamond believes that Europeans evolved other advantages as well, but disease resistance is by far the most important and it forms the crux of his argument.

Like Fukuyama, Diamond places great emphasis on the development of agriculture when contemplating the major events in human history. Relying on the research of scholars before him, he convincingly claims that humans grudgingly abandoned hunting and gathering, which affords considerable leisure, for the hard work of farming:

> Although humans had been manipulating wild plants and animals for a long time, hunter–gatherer behavior began to change at the end of the Pleistocene because of increasingly unpredictable climate, decreases in big-game species that were hunters' first-choice prey, and increasing human occupation of available habitats. To decrease the risk of unpredictable variation in food supply, people broadened their diets (the so-called broad-spectrum revolution) to second- and third-choice foods, which included more small game, plus plant foods requiring much preparation, such as grinding, leaching and soaking. Eventually, people transported some wild plants (such as wild cereals) from their natural habitats to more productive habitats and began intentional cultivation.[806]

Unlike Fukuyama, Diamond pays particular attention to an often-overlooked corollary of farming: farm animals. Cows, sheep, chicken, pigs, horses, all of these animals provided immediate benefit to the humans who domesticated them. Furs gave you warmth, oxen made plowing easier, and leather was like the original duct tape, it helped with everything. Paradoxically, however, in Diamond's analysis the biggest benefit of farm

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Some of the other biological advantages he cites are "the evolution of adult-persistent lactase in milk-consuming populations of northern Europe and several parts of Africa, the evolution of allozymes of alcohol metabolism permitting consumption of large quantities of nutritionally important beer in western Eurasia, and the evolution of adaptations to a diet higher in simple carbohydrates, saturated fats and calories and salt, and lower in fibre, complex carbohydrates, calcium and unsaturated fats, than the hunter-gatherer diet." Diamond, *Guns, Germs, and Steel*, 704.

[806] Jared Diamond, "Evolution, Consequences and Future of Plant and Animal Domestication," *Nature* 418 (August, 2002): 700.

animals was their diseases. Europeans got infected with smallpox, the measles, and the flu by living among animals.[807] This, of course, resulted in tremendous short-term suffering and death, but in the long run it provided them with an almost invincible weapon in their colonization efforts. Diamond explains, "the humans who domesticated animals were the first to fall victim to the newly evolved germs, but those humans then evolved substantial resistance to the new diseases. When such partly immune people came into contact with others who had had no previous exposure to the germs, epidemics resulted in which up to ninety-nine percent of the previously unexposed population was killed."[808] Ninety-nine percent! That level of devastation is almost inconceivable, and while the exact percentage is disputed, even the lower estimates appear apocalyptic. Knowing this, it is hard to take seriously the previous claims of intellectual or cultural superiority as the explanation for the rise of European global dominance in the seventeenth century. By incorporating evolution into his geographical research, Diamond found a more plausible explanation, one that could also serve as an answer to Yali's question: "luck."

Many of those who carry the mantle of intellectual leadership in contemporary America view the world through an evolutionary lens. As professors at the top universities and winners of prestigious awards, they exert considerable influence on the intellectual discourse throughout the country, both in academia and in popular culture.

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[807] People living in North and South America at the time had also developed agriculture, but as luck would have it there was a shortage of animals that could be domesticated. By the time Europeans arrived, the llama, guinea pig, and dog were the only ones who had become tame.

[808] Diamond, *Guns, Germs, and Steel,* 92.

This is not to say that evolution has become orthodoxy in all disciplines. There still exists strenuous debate surrounding the appropriate role of biology in the social sciences. However, a casual examination of popular podcasts, magazine articles, and books reveals just how widespread evolutionary thinking has become. Of course, simply pointing out this obvious development, while potentially entertaining, is no significant contribution to intellectual history. What is required, and what I hope to have achieved, is to explain why—and to a lesser extent how—evolution went from heterodoxy to respectability, from taboo to the mainstream.

The Hungarian physiologist and Nobel Prize winner Albert Szent-Györgyi once said, "Discovery consists of looking at the same thing as everyone else and thinking something different."[809] Today, evolutionary arguments are commonplace, almost banal. Considering the general acceptance of Darwin and natural selection, one could reasonably assume that the popularity of evolutionary arguments was predictable, even inevitable. This assumption, as we have seen, is far from the truth. My research has discovered the tumultuous, contested history behind evolution's current place of privilege.

In the late 1800s intellectuals of all stripes sought to claim Darwin as one of their own, for establishing ties with the new dominant scientific paradigm brought tremendous credibility. Socialists and anarchists argued that humans were competing against nature and thus cooperation was the logical solution while their opponents believed human

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[809] Albert Szent-Györgyi, *Bridging the Present and the Future: IEEE Professional Communication Society Conference Record* (Williamsburg: IEEE Professional Communication Society, 1985), 14.

beings were competing against each other in a ruthless "survival of the fittest." By the turn of the twentieth-century political conservatives had won the contest due in large part to the left's support for "soft inheritance," or the inheritance of acquired characteristics, which August Weisman discredited in his experiments on mice. The result was a rise in "Social Darwinism," or the belief that government should not interfere in the emergence of a natural economic and political hierarchy among its citizens. Not surprisingly, this belief benefited those currently in power, namely white men. Eugenics, scientific racism, and, eventually, the holocaust all emerged as the logical outcome of a worldview based on the positive effects of evolution among populations of superior and inferior people.[810]

After the defeat of the Axis powers in 1945, intellectuals throughout the West repudiated the notion of any meaningful biological difference between races or genders. While not a repudiation of science or evolution *per se* (most everyone still recognized that human beings had evolved), the consensus throughout academia was that culture—and culture alone—explained why people behaved as they did. The taboo against biological thinking in the social sciences achieved official sanction in some instances, most notably in UNESCO's 1950 publication of "The Race Question," which stated categorically that "most, if not all, measurable characters, the differences among individuals belonging to the same race are greater than the differences that occur between the observed averages for two or more races within the same major group."[811] For the most part, however, there was just an implicit agreement among intellectuals that cultural

[810] Less well known is that the holocaust targeted not only Jews but millions of homosexuals, Roma, mentally disabled, and others preventing the evolution of a supposedly "master race."

[811] UNESCO, "The Question of Race," 1950.

analysis was preferable because it avoided the seemingly inevitable slippery slope toward racism and sexism that had plagued biological narratives.

During the post-WWII taboo against biological thinking, academics proposed a number of interesting, innovative theories and experiments purporting to prove the almost infinite malleability of human behavior. For example, "behaviorism," the brainchild of psychologist B.F. Skinner, claimed that people learned algorithmically: positive feedback encouraged more of the same behavior and negative feedback discouraged it. According to Skinner, there are no intrinsic predispositions toward certain behavior, just conditioned responses. You can hear echoes (or shouts, depending with whom you are speaking) of Skinner's theory in discussions about crime today. These thinkers argue against personal responsibility, instead claiming that the decision to commit a crime is a result of unfortunate circumstances. In a similar vein, if perhaps even more radical, during this era one's gender identity came to be seen as largely a by-product of cultural conditioning. Informally, many families, including my own, experimented with gender-neutral toys in an attempt to discourage boys and girls from developing stereotypical aggression or passivity. The apotheosis of gender neutrality theory took place in the 1960s. David Reimer was born a boy but doctors permanently disfigured his penis during circumcision and psychologists convinced them to raise David as a girl named "Brenda." Grow his hair long and give him positive feedback for being feminine, the theory went, and he should grow up to be a well-adjusted woman. Unfortunately for David, the gender reassignment never really worked and he struggled for years with depression, ultimately taking his own life in 2002.[812]

[812]The unique circumstances surrounding David's case make it difficult to

Around this same time, developments in evolutionary biology opened the door for a new chapter in the social sciences, one that took into consideration, and often relied upon, evolutionary thinking when constructing theories of human affairs. Building on the populational genetics of R.A. Fisher and others, William Hamilton derived a mathematical formula for the evolutionary logic of altruism among kin, $C < r \times B$, where C is the cost in fitness to the actor, r is the genetic relatedness, and B is the benefit to the recipient. Then, only a few years later, a young graduate student named Robert Trivers expanded Hamilton's theory to explain cooperation among non-kin in a process known as "reciprocal altruism." Evolution, it appeared, was not simply ruthless competition; it was also kindness and sacrifice.

Almost immediately a small number of social scientists began to investigate the implications of Hamilton and Trivers' research. Many of these men and women were graduate students or young professors who had personal relationships with Hamilton or Trivers, and, importantly, for the most part they had at least some training in biology (interdisciplinary education being on the rise at this time due to C.P. Snow's damning condemnation of the knowledge gap between the "two cultures" of academia). Their background in the natural sciences was critical because it gave them exposure to an intellectual discourse unencumbered by the taboo against biological analyses of human affairs.

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extrapolate general principles from his experience. His depression and eventual suicide might have been completely unrelated to his gender reassignment; however, it is clear that he struggled with being a girl. Perhaps the only clear lesson we can learn from David is how hard it is to be treated as a gender you don't identify with.

The seeds had been sown for a biological social science, but the new discipline, sociobiology, grew slowly at first. Due to their age and relatively minor academic standing, the first sociobiologists had little impact. Then, in 1975, world famous entomologist E.O. Wilson synthesized the existing research into a massive tome, *Sociobiology: The New Synthesis*, and this released a deluge of sociobiological publications followed by condemnation from those committed to strictly cultural analysis in the social sciences. The two sides quickly became enmeshed in a polemical exchange, with the sociobiologists claiming that their critics were antiscience, politically motivated Marxists and the critics charging the sociobiologists with racism and sexism. Much of this discourse can be dismissed as partisan mud slinging; however, the argument did have one important effect. By thoroughly scrutinizing the early sociobiological publications for errors—and fiercely criticizing the authors when they found them—the critics forced the sociobiologists to curtail their speculations on the genetic basis for specific behaviors, as there was not sufficient evidence to support these claims. As a result, many of the early sociobiologists and those inspired by them began to focus on the evolution of human psychology.

The switch in emphasis from behavior to general psychological predispositions did not deter all criticism but it has proved tremendously influential. Besides those on the intellectual fringes who view human behavior as entirely the by-product of either cultural conditioning or genetic determinism, the majority of thoughtful people recognize it to be the result of exposure to environment constrained by biological hardwiring. The leaders of disciplines throughout the social sciences and humanities have rejected the earlier taboo against evolutionary thinking in their fields and now actively seek to integrate, or at

least be compatible with, current accepted theories in the natural sciences. Due to their influence, today's intellectual dialogue in the United States has become so saturated with evolution that it can go unnoticed—like water to a fish. But what an incredible, contested history lies just beneath the surface.

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